...T, MAY 18, 1939 FIRST AERO WEEKLY IN THE WORLD ...AS A NEWSPAPER

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FLIGHT ...C.D

R.A.F

The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

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FLIGHT
The AIRCRAFT ENGINEER

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The Outlook

A Notable Occasion

YEAR in, year out, *Flight* keeps in touch with the Royal Air Force, describing the technical features of its new types of machines as those details are released for publication, recording and commenting on the developments and changes in its organisation, paying visits to individual squadrons and describing their work and recalling their war history.

Once a year a special issue is brought out which is devoted almost entirely to the Royal Air Force. In former days this special number was always published in the week when the Display at Hendon was held. That gorgeous spectacle is now a thing of the past, but its mantle has fallen upon Empire Air Day, and so the week in which that day occurs has been chosen for our special R.A.F. issue. It is a day on which the Air Force is host to the British public, and that public warmly welcomes the chance of seeing for itself something of the inner workings of what has become the most popular of the fighting Services. It is the only day in the year on which many people have a chance of seeing an aeroplane at close quarters, let alone climbing into a cockpit and working the controls—in fact, of doing almost everything that the public loves to do except flying the machine and writing their names upon (or through) its wings.

Filled with a desire to learn all that can be learnt about the R.A.F., the public will, we believe, welcome the information given in this special issue of *Flight*; and we hope that the officers and men in the Service will also find in it much to approve.

The Fleet Air Arm has not this year opened any of its four ground stations to the public, but it must be remembered that Navy Week is not far ahead, and that then a fine display of naval air work will be given to the public; so the result will be two air occasions instead of one.

Atlantic Delays

THE official statement issued by Imperial Airways last Thursday evening, that it will not be possible to start the Atlantic experimental flights on June 1 as planned, confirms our forecast in *Flight* of April 27, when we predicted that it was unlikely that these flights could start on the scheduled date.

It is, of course, obvious that before the crossings could be undertaken with that degree of confidence which is necessary, some hundreds of hours test flying of the new boats should be made over home waters. The delay in delivering the boats ready for refuelling has prevented such tests from being made up till now.

The delay is regrettable because capital will undoubtedly be made of it by those who are ever ready to detract from British flying achievements. Actually there is nothing seriously wrong, and to prevent exaggerations from being spread about it seems wise to state the true facts. So far as we have been able to ascertain them they are as follows:—

Certain cooling problems were encountered during taxying trials, and when those had been overcome it was discovered that, during aerial refuelling, the petrol system tended to allow one tank to fill and overflow before the others had filled up. It is only a matter of incorporating certain valves in the system, and then this trouble should disappear. There is nothing very alarming in any of these difficulties, and they will undoubtedly be overcome very shortly. But when they are there will, as we have already said, have to be a period of experiment before the actual Atlantic flights can begin.

In the meantime, Sir Alan Cobham is ready at Ford to do his share of the refuelling tests. Two of the tankers are already at Botwood, in Newfoundland, the crews are trained and ready to begin, and from the moment the flying boats are received there should be no delay in making the final tests.

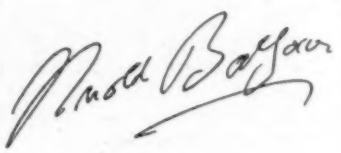
A Message to "Flight" Readers from Captain Harold Balfour, M.C., M.P., Under-Secretary of State for Air

THIS special issue of *Flight* comes at an appropriate time, as it is within a few days of the completion of the fourth year of the expansion of the Royal Air Force. Its articles and photographs effectively reveal the manner in which our extensive programme is being executed. There is, of course, much important information which for Service reasons cannot be disclosed, but enough is available to give some idea of the magnitude of the effort which is being made by the Royal Air Force and by the Industry on which it must depend for its aircraft, engines and equipment.

The public will have an excellent opportunity on Empire Air Day to see for themselves many of the various phases of training in the Royal Air Force. I feel sure that they will be impressed both by the quality of the flying and of the aircraft with which the Air Force is now equipped. I know from my own visits to Royal Air Force stations that, although the numbers of personnel have nearly quadrupled since 1935, their quality is as high as ever, and I believe it is unrivalled by any Air Force in the world.

Special arrangements have been made at all Royal Air Force stations to provide visitors with an opportunity of gathering information about the various branches of the Royal Air Force and its Auxiliary and Reserve services in which National Service can be undertaken. At the present time our chief needs are for Air Observers, Wireless Operators/Air Gunners, and various skilled and semi-skilled men for the R.A.F. Volunteer Reserve. But there is also a special opportunity for ex-airmen who served with the R.F.C., R.N.A.S., and R.A.F. This is known as Class E Reserve, and the Officer-in-Charge, Record Office, Ruislip, will be glad to receive the names and present addresses of ex-airmen of all trades and ranks.

On Empire Air Day the public will be the guests of the Royal Air Force; but except on special occasions it is on journals like *Flight* that they must chiefly depend for their knowledge of the progress and development of the Royal Air Force. I therefore particularly welcome the initiative of the editorial staff in producing this excellent number.



Organising the F.A.A.

SOME time ago it was remarked in these columns that while the Navy in general and the Fleet Air Arm in particular were simultaneously expanding, it would not be possible for many ratings, and particularly skilled artificers, to be spared for the Fleet Air Arm. Actually most of the highly skilled maintenance men are being provided by transfers from the Royal Air Force. But the Admiralty have decided upon a new organisation.

A new Flying Branch of the Navy is being instituted, and will be administered by the Rear Admiral, Naval Air Stations, at Lee-on-Solent, the headquarters of the new Fleet Air Arm Division. All training, drafting, and advancement of the personnel will be centralised, and ratings of the new branch will belong to the Fleet Air Arm Division instead of being attached to one of the three Home Ports. The flying branch will in future largely recruit its men direct from the shore. Men will be enlisted under the title of Naval Airmen.

Of course, the majority of the pilots and observers in the Fleet Air Arm are still ordinary Naval or Marine officers, as they have always been since the Balfour Committee. The tendency, however, seems to be to separate the personnel of the Fleet Air Arm more and more from the personnel which manages the ships. It really begins to look as if the F.A.A. will in future become a partially separate Service analagous to the Royal Marines.

The Pigeons Return

IN this mechanical age, when the internal combustion engine has all but driven the horse out of the Army, and when pilots rely on instruments instead of their eyes to find their way through the air, it is strange to see the carrier pigeon coming back into the R.A.F. scheme of things as a means of communication.

In the Great War the seaplanes of the R.N.A.S. usually carried pigeons which were released when a machine was forced down and could not send wireless tidings of its plight and its whereabouts. On several occasions these pigeons were the means of directing the rescuers to the foundered craft and so saving the lives of the crew. On a good many other occasions the birds failed to reach the shore, and gave their own lives in the attempt to save the lives of the airmen. Recently we had come to look on those stories as examples of the primitive methods which they used to employ twenty one years ago. Yet the Air Ministry is once more organising a National Pigeon Service, stating frankly that carrying pigeons is an additional safety measure for reconnaissance aircraft when wireless communications break down, and of special value in the event of an aircraft making a forced landing on the sea. Evidently the triumph of science over Nature is not yet absolute.

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POWERS of the AIR ARM

The Third Service : How It Has Developed

By MAJOR F. A. de V. ROBERTSON, V.D.

Active Air Defence : Spitfire fighters are among the most potent foes of the raiding bomber.

THE year 1939 has seen the coming of age of the Royal Air Force, and it is, therefore, a fitting occasion to examine and reflect on the developments which have taken place during its twenty-one years of life. Everyone has, of course, been impressed by the technical advances made, but the increases in speed, range, reliability and so on are but one side of the picture. In this article it is proposed rather to examine the theories for the use of air power which have developed since April 1, 1918.

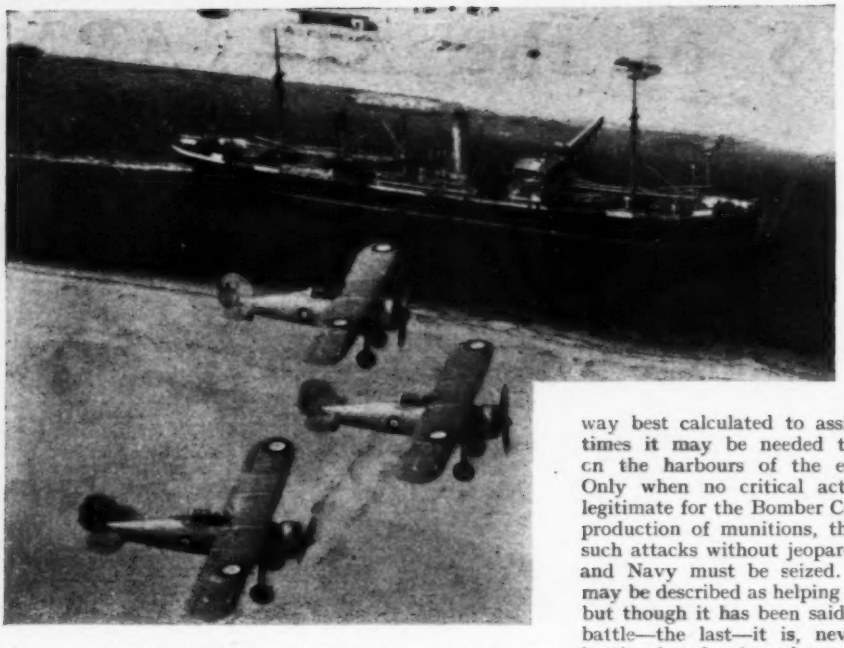
The first real appearance of the Royal Air Force, as apart from the Royal Naval Air Service and the Royal Flying Corps, was the Independent Air Force which was sent to France in 1918. It was under the general control of Marshal Foch as Generalissimo of the Allied Forces on the Western Front, but it was not under the command of Lord Haig, the Commander-in-Chief of the British Armies in France and Belgium. This independence seems to have been a gesture to show the world that a new Service had come into being under a separate Ministry. There was no valid strategical reason why the Independent Air Force should not have been placed under Lord Haig. Its duties were to assist the Army in a land war by attacking the German munition factories in the Rhine towns. Its independence of the British Commander-in-Chief meant that it was sometimes attacking munition factories at a time when every available bomber should have been concentrated on the railways which brought German reinforcements and supplies up to the firing line. Presumably, this dissipation of effort would not have been allowed if the Independent Air Force had been under the command of Lord Haig. However, the Independent Air Force was the first attempt at formulating a theory for the use of air power.

The new 3.7 anti-aircraft gun has now been issued to the T.A. artillery. It is a most valuable ally of the fighter aircraft.

After the Armistice men had more time and leisure to think calmly and to consider the capabilities and also the limitations of the air arm. One must mention the part played by R.A.F. aircraft in suppressing the Mad Mullah in Somaliland. This was actually just valuable help given to the Army, but it was suggestive of independent air action in suitable terrain. For years the Mad Mullah had defied our expeditionary forces, because the scrub jungle in which he operated told against the operations of regular troops. Evasion was always possible for the irregular tribesmen, until the aeroplanes, flying overhead, were able to locate the Mullah's concentrations and to strike them hard. The career of this pest was brought to a speedy close.

The air defence of Great Britain is a study by itself. Its main principles had been worked out before the end of the war by Major General E. B. Ashmore, though all of the doctrines which he laid down have not even yet been accepted by the Government. Responsibility for this defence was entrusted in turn to the Admiralty, the War Office and the Air Ministry. It is now accepted beyond question that this most important matter is rightly a function of the Air Ministry. The chief weapon of the defence is the fighter aeroplane, and, therefore, the Air Ministry is the proper authority to direct the whole of the proceedings. General Ashmore urged unity of responsibility and of command. Such unity is a vital principle of war, and to disregard that principle almost invariably leads to loss, if not to disaster. Concession to the principle of unity has been granted up to the point of placing the anti-aircraft ground troops under the operational command of the Air Officer who is responsible for the air defence of the country, but General Ashmore would have had those troops also under the administrative charge of the Air Ministry. One result—a result which might have been expected—of leaving the A.A. ground troops under the administrative care of the War Office was that when the crisis of last September descended upon us those troops were found to be terribly short of modern weapons and instruments, and very far from being able to give that assistance to the fighter aircraft which is a necessity of successful air defence.

It is naturally impracticable to make a radical change at the present moment when the War Office is engaged with



R.A.F. Gladiator fighters flying along the Suez Canal are one example of the work of the R.A.F. in the Middle East Command. This is the only overseas Command which has fighters at its disposal, an innovation made necessary by the Italian conquest of Abyssinia. It is also the only overseas Command to have at its head an Air Officer Commanding-in-Chief.

al. its energies in recruiting and equipping new and large formations of A.A. troops, but the principle of divided responsibility is as unsound now as ever; and sooner or later it will be recognised that the ground troops as well as the air squadrons must be completely under the control of the Air Ministry.

From a very early stage the Air Ministry recognised the prime importance of the air defence of Great Britain, and did what was possible to increase the dignity and efficiency of this branch of air power by creating a Command known as Air Defence of Great Britain, and placing it under an officer with the title of Air Officer Commanding-in-Chief. That officer had under him a Fighting Area and a Bombing Area, presumably because of the saying that "attack is the best form of defence." Such an amalgamation was only possible because the numbers at the time were small. It has since been recognised that, with all due respect to the above-quoted motto, the active defence and the counter-attack are separate operations, each important enough to engage the full energies of a Commander-in-Chief. This elaboration is certainly a sounder arrangement than was the previous one. The Fighter Command is in a sense static; it is tied to the defence of a certain locality, i.e., Great Britain, while the Bomber Command exemplifies the flexibility of the Royal Air Force, and can be employed, like the cavalry in former times, as an "arm of opportunity." It is only to be hoped that the Bomber Command will not attempt to imitate the independence of the old Independent Air Force, but will be used by some higher authority, perhaps a War Cabinet, for the purpose most essential at each moment.

Viscount Trenchard was the General who commanded the Independent Air Force in France in 1918. This Force was the first manifestation of the Royal Air Force as a separate Fighting Service capable of waging war on its own. From this beginning have sprung all the developments mentioned in this article.
"Flight" photograph.

When armies are on the move, or when they are engaged in battle, the main care of the Bomber Command should be to attack the enemy's army in the way best calculated to assist our own Army. At other times it may be needed to help the Navy by attacks on the harbours of the enemy or even on his fleets. Only when no critical action is in progress will it be legitimate for the Bomber Command to attack the enemy's production of munitions, though every chance of making such attacks without jeopardising the success of our Army and Navy must be seized. Bombing munition factories may be described as helping to win the battle of to-morrow, but though it has been said that the British win only one battle—the last—it is, nevertheless, unwise to lose the battle of to-day in order to win the battle of to-morrow.

While the air defence of the Homeland has consistently been the anxious care of the Air Ministry, there have been notable developments in the theories of using aircraft overseas. The credit for the most revolutionary step of this kind must go to Mr. Winston Churchill when he was Secretary for the Colonies and Mandated Territories. He handed over the charge of Iraq to the Royal Air Force. It was an astonishing innovation and shocked the conservative elements of the Army to the core. It may be that Mr. Churchill had studied the success of the aircraft in Somaliland and had been impressed by their potentialities in desert country. Though the aeroplanes had acted as ancillary troops of the Army in the Mad Mullah campaign, yet their action had been almost independent. Extensive deserts are not the sort of country in which ground troops show to the best advantage. They need much transport, especially of water, and their movements are slow. They must expect sick casualties as well as casualties in action.

Air Troops and Ground Troops

The expeditions are very expensive, and their results are not always decisive. Aircraft are subject to none of these disabilities, and, in fact, deserts give them the best chance of using their powers with swift and definite results. None the less, only an original and bold mind would have conceived the idea of removing Iraq from the charge of the Army and handing it over to that of the youngest fighting Service. The success of the experiment is so well known that it is not necessary to elaborate the point here. The practice has become known as "Control without Occupation."

One very wise step was taken in Iraq and similar countries. The aeroplanes need help from the ground at times, and the ground troops must be fast-moving and self-contained. Armoured cars were chosen as the ideal form of ground troops, and they have fully justified all expectations. There was perhaps nothing very original in that choice. What was so admirable was that the Royal Air Force was allowed to raise its own companies of armoured cars and to man them with its own personnel. In this way the principle of unity of command was observed and the closest collaboration of air forces and ground troops was assured. Again the conservative elements of the Army were shocked and one distinguished soldier, who had become a Member of Parliament, protested loudly that the armoured cars and their personnel ought to have been borrowed from the War Office. Fortunately, his protests achieved nothing.

The principle of air control was also extended to Aden

and to Palestine and Trans-Jordan. In Aden it has proved as great a success as in Iraq, although the country is mountainous. One squadron of bomber aircraft and a section of armoured cars have been enough to reduce to speedy submission any tribe which showed a disposition to violate the Pax Britannica. Such outbreaks are still frequent, and one shudders to think of what the cost would be in money and bloodshed if each one of them had to be dealt with by an Army expedition.

While dealing with these desert tribes the R.A.F. has elaborated a technique which ensures success at a minimum of cost and with a minimum of bloodshed. In fact, it cannot be stated with too much emphasis that the object of air control is to avoid bloodshed when enforcing the law. When a tribe is contumacious and the efforts of the political officers have failed to make it see reason, air action is called for. The warnings to evacuate their village are now always obeyed by the tribesmen, who take refuge in caves in neighbouring hills. The aeroplanes confine their punitive action to blowing up the houses of the chief malefactors, but do no other damage. Then one aeroplane, relieved at suitable intervals, takes up sentry-go over the village, preventing any villager from visiting the locality during the day. Bombs with delay-action fuses forbid the village to its inhabitants during the night—due warning of their nature having been given. This action can be kept up indefinitely, and its result is certain. Sooner or later the tribe submits and pays the fines ordered by the Government, and nobody is hurt at all unless he has wilfully disregarded the warnings.

Helping the Navy and Army

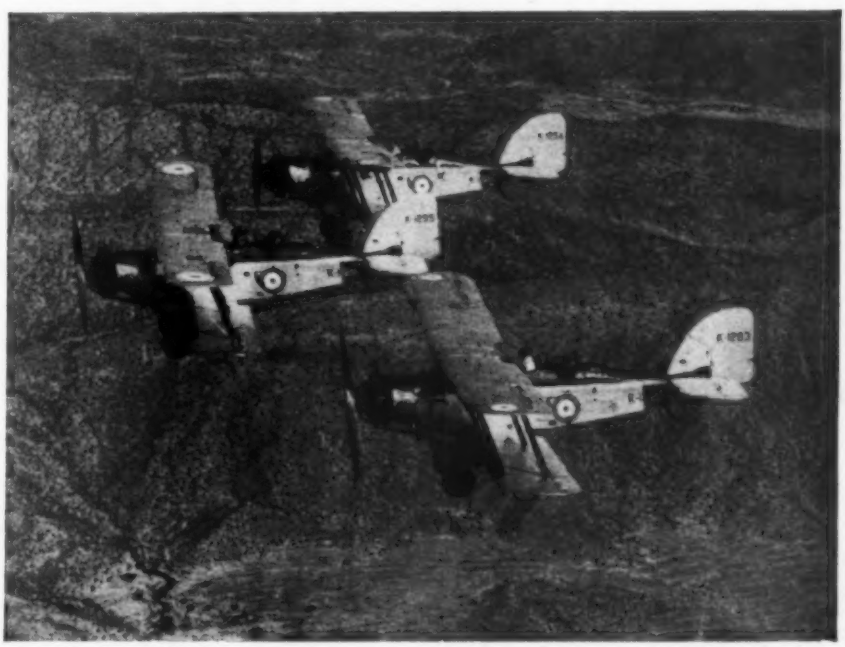
In Palestine it was found that the R.A.F. was not the best Service to take control. When the present troubles started they took the form of riots in the cities, and with them the aeroplanes could not deal as indiscriminate bombing of packed streets was out of the question. So the command there was restored to the Army, while air squadrons give the troops very great help in dealing with bands of insurgents in the hill country.

In India it seems that no decision has yet been arrived at as to the exact powers and limitations of the R.A.F. Fighting against tribesmen has been more or less incessant on the North-West Frontier for a long time past. In the main the R.A.F. squadrons act in support of the Army. There is no doubt whatever of their value for reconnaissance, and the observer in the sky can tell the General what is on the other side of the hill or on top of the hill with a speed previously unknown. The aeroplanes are also used there in support of the infantry when the latter assault a position, and their bombs and machine guns give the greatest help to the troops. At times the bombers are used to obliterate a village which has become a centre of unrest, but independent air action is not accepted on the Frontier as sufficient by itself, though it is impossible to say what developments the future may have in store.

In Singapore we find the R.A.F. playing a very different part. That city has become a great base, strong in itself, but also a centre from which British power can strike out in almost any direction. Reconnaissance over the sea is one prime necessity at Singapore. Mobility, and the ability to reinforce towards either Australia, Hong Kong, or India, is another need; while a third is the capacity to strike hard at any hostile force approaching across the sea. Flying boats provide the reconnaissance force there, and they have also a certain power to strike with bombs. For defence nearer in, torpedo-bomber squadrons are employed as they can make themselves a serious menace to an approaching fleet. The duties of the R.A.F. at Singapore are primarily to work in conjunction with the Navy (including the Australian Navy).

When the Air Ministry first made Air Defence of Great Britain into a separate Command, Air Marshal (now Marshal of the Royal Air Force) Sir John Salmond was entrusted with its formation and organisation. He was the first R.A.F. officer to bear the title of Air Officer Commanding - in - Chief. Previously he had been the first Air Officer to assume supreme command of the British forces in Iraq, and so he has been connected with two notable developments of air power.

The Fleet Air Arm is developing on lines hardly conceived during the Great War. The development of the flying deck and the catapult have made possible many forms of activity which were beyond the horizon in 1918. Reconnaissance remains here, as in other aircraft spheres, a prime duty. Spotting for the guns should increase the effectiveness of the Fleet's fire. It is always the object of the British Navy to bring the enemy to battle, and often, as at Jutland, the object of the enemy is to get away while the going is good. A mass attack by bombers and torpedo-planes on the enemy's fleet may be expected to produce at least one lame duck in the enemy's fleet, and a lame duck has to be either defended or abandoned. That by itself might well convert a Jutland into a Trafalgar.



"Fighting against tribesmen has been more or less incessant on the North-West Frontier for a long time past." Wapitis—now very near the end of long and faithful service—on a raid into Warizistan.

STANDARD AIRCRAFT of the R.A.F.

A Concise Pictorial and Factual Review

THE machines illustrated in the following pages are, with one or two exceptions, used in large numbers by squadrons of the Royal Air Force. In addition to these there are several obsolescent types—notably versions of the outstandingly successful Hawker two-seater biplane (e.g., Harts, Ospreys, Audaxes and Hardys); these, however, are not included as they are basically similar in design to the Hind.

The performances quoted are, in the main, based on manufacturers' data. Figures for range are typical and will, of course, vary according to the military load. In certain cases, for obvious reasons, gaps occur.

ANSON

DUTIES: General reconnaissance and training.
DESIGNING FIRM: A. V. Roe and Co., Ltd.
NUMBER OF CREW: Three.
CONSTRUCTION: Wood and metal.
POWER PLANT: 2 Armstrong Siddeley Cheetah IX.
TOTAL H.P.: 700 h.p. at 7,300ft.
GROSS WEIGHT: 7,665 lb.
WING SPAN: 56ft. 6in.
TOP SPEED: 188 m.p.h.
ARMAMENT: 2 machine guns + bombs.

BATTLE II

DUTIES: Bombing.
DESIGNING FIRM: Fairey Aviation Co., Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Merlin II or III.
TOTAL H.P.: 1,030 h.p. at 16,250ft.
GROSS WEIGHT: 10,792lb.
WING SPAN: 54ft.
TOP SPEED: 257 m.p.h.
RANGE: 1,000 miles.
ARMAMENT: 2 machine guns + bombs.

BLENHEIM (Long-nosed)

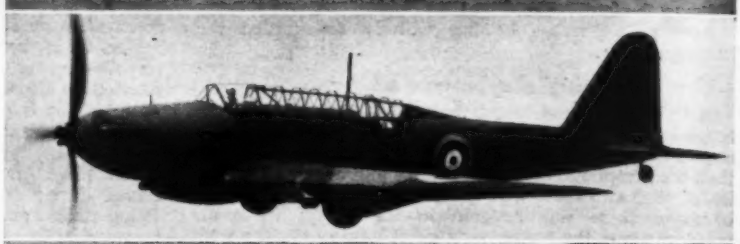
DUTIES: Bombing and reconnaissance.
DESIGNING FIRM: Bristol Aeroplane Co., Ltd.
NUMBER OF CREW: Three.
CONSTRUCTION: Metal.
POWER PLANT: 2 Mercury VIII.
TOTAL H.P.: 1,680 at 14,000ft.
WING SPAN: 56ft. 4in.
TOP SPEED: 295 m.p.h.
RANGE: 1,900 miles.
ARMAMENT: 2 machine guns + bombs.

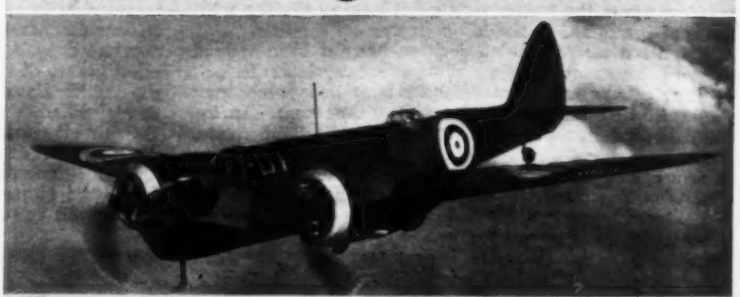
BLENHEIM (Standard)

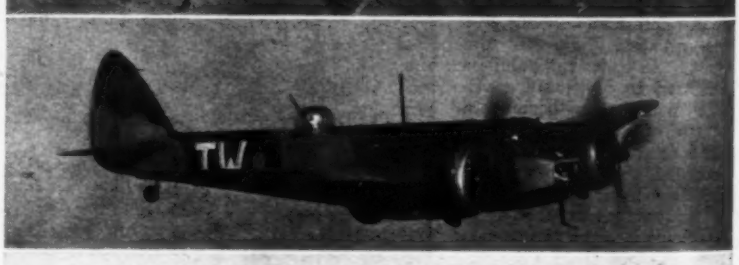
DUTIES: Bombing.
DESIGNING FIRM: Bristol Aeroplane Co., Ltd.
NUMBER OF CREW: Three.
CONSTRUCTION: Metal.
POWER PLANT: 2 Mercury VIII.
TOTAL H.P.: 1,680 at 14,000ft.
GROSS WEIGHT: 12,500 lb.
WING SPAN: 56ft. 4in.
TOP SPEED: 285 m.p.h.
RANGE: 1,125 miles.
ARMAMENT: 2 machine guns + bombs.

BOMBAY

DUTIES: Transport and bombing.
DESIGNING FIRM: Bristol Aeroplane Co., Ltd.
NUMBER OF CREW: Three-four.
CONSTRUCTION: Metal.
POWER PLANT: 2 Bristol Pegasus.
TOTAL H.P.: 1,800 (approx.).
WING SPAN: 96ft.

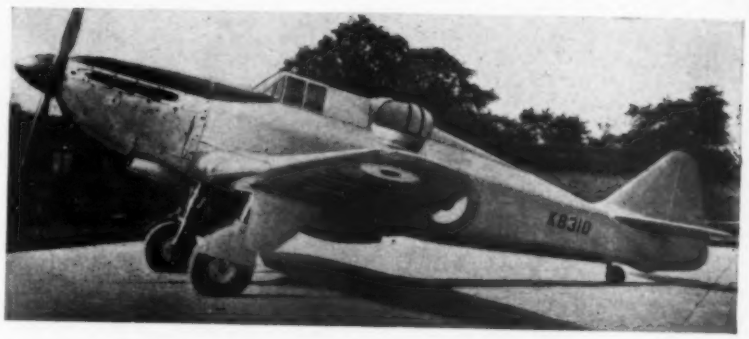






DEFIANT I

DUTIES: Fighting.
DESIGNING FIRM: Boulton Paul Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Merlin.
TOTAL H.P.: Over 1,000.
WING SPAN: 39ft. 6in.
ARMAMENT: Several machine guns.



DEMON (Turret)

DUTIES: Fighting.
DESIGNING FIRM: Hawker Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Kestrel V (de-rated).
TOTAL H.P.: 560.
GROSS WEIGHT: 4,670 lb.
WING SPAN: 37ft. 3in.
TOP SPEED: 186 m.p.h.
RANGE: 415 miles.
ARMAMENT: 3 machine guns + bombs.

DON

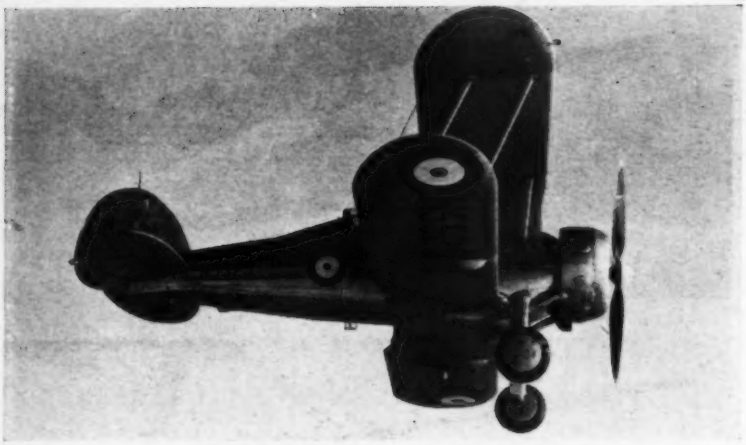
DUTIES: Communications and training.
DESIGNING FIRM: De Havilland Aircraft Co., Ltd.
NUMBER OF CREW: One-two.
CONSTRUCTION: Wood.
POWER PLANT: Gipsy King I.
TOTAL H.P.: 433 at 8,750ft.
GROSS WEIGHT: 6,530 lb.
WING SPAN: 47ft. 6in.
TOP SPEED: 213 m.p.h.
RANGE: 890 miles.

FURY II

DUTIES: Fighting.
DESIGNING FIRM: Hawker Aircraft, Ltd.
NUMBER OF CREW: One.
CONSTRUCTION: Metal and wood.
POWER PLANT: Rolls-Royce Kestrel V.
TOTAL H.P.: 640 at 14,000ft.
GROSS WEIGHT: 3,610 lb.
WING SPAN: 30ft.
TOP SPEED: 223 m.p.h.
ARMAMENT: 2 machine guns.

GAUNTLET II

DUTIES: Fighting.
DESIGNING FIRM: Gloster Aircraft Co., Ltd.
NUMBER OF CREW: One.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Mercury VIs.
TOTAL H.P.: 645 at 15,500ft.
GROSS WEIGHT: 4,050 lb.
WING SPAN: 32ft. 10in.
TOP SPEED: 230 m.p.h.
RANGE: 460 miles.
ARMAMENT: 2 machine guns + bombs.

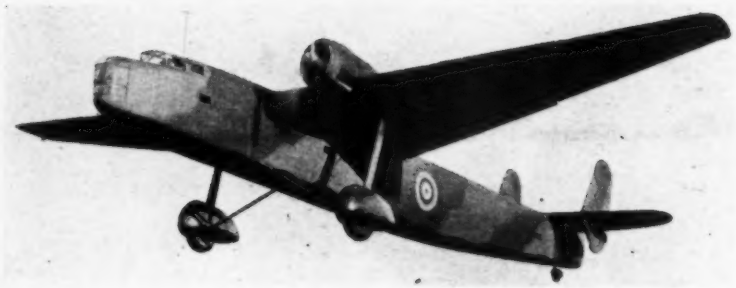


GLADIATOR

DUTIES: Fighting.
DESIGNING FIRM: Gloster Aircraft Co., Ltd.
NUMBER OF CREW: One.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Mercury IX.
TOTAL H.P.: 840 at 14,500ft.
GROSS WEIGHT: 4,750 lb.
WING SPAN: 32ft. 3in.
TOP SPEED: 250 m.p.h.
RANGE: 420 miles.
ARMAMENT: 4 machine guns + bombs.
N.B.—See Gladiator (illustrated) is similar.

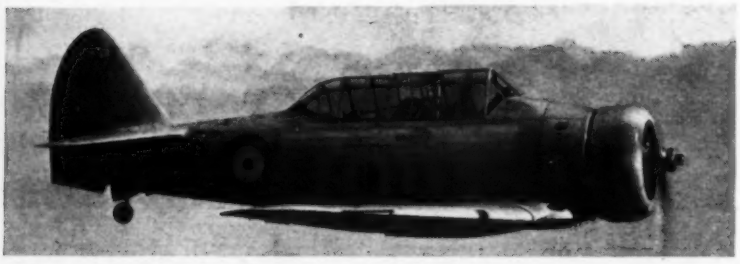
HAMPDEN I

DUTIES: Bombing.
DESIGNING FIRM: Handley Page, Ltd.
NUMBER OF CREW: Three-four.
CONSTRUCTION: Metal.
POWER PLANT: 2 Bristol Pegasus XVIII.
TOTAL H.P.: 1,770 at 15,500ft.
GROSS WEIGHT: 18,756 lb.
WING SPAN: 69ft. 4in.
TOP SPEED: 265 m.p.h.
RANGE: 1,790 miles.
ARMAMENT: 4 machine guns + bombs.



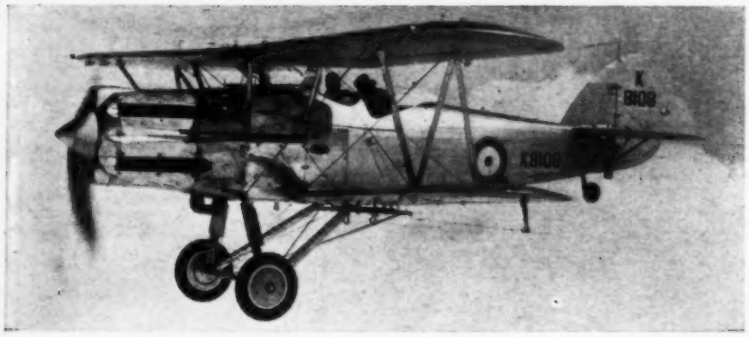
HARROW II

DUTIES: Bombing.
DESIGNING FIRM: Handley Page, Ltd.
NUMBER OF CREW: Four-five.
CONSTRUCTION: Metal.
POWER PLANT: 2 Bristol Pegasus XX.
TOTAL H.P.: 1,850 at 10,000ft.
GROSS WEIGHT: 23,500 lb.
WING SPAN: 88ft. 5in.
TOP SPEED: 200 m.p.h.
RANGE: 1,150 miles.
ARMAMENT: 5 machine guns + bombs.



HARVARD

DUTIES: Advanced training.
DESIGNING FIRM: North American Aircraft Inc.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Pratt & Whitney Wasp H.
TOTAL H.P.: 550 at 5,000ft.
GROSS WEIGHT: 5,130 lb.
WING SPAN: 42ft.
TOP SPEED: 210 m.p.h.
RANGE: 750 miles.
ARMAMENT: 1-2 machine guns.



HECTOR

DUTIES: Army co-operation.
DESIGNING FIRM: Hawker Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Napier Dagger III.
TOTAL H.P.: 805 at 5,000ft.
GROSS WEIGHT: 4,880 lb.
WING SPAN: 37ft. 3in.
TOP SPEED: 191 m.p.h.
RANGE: 400 miles (approx.).
ARMAMENT: 2 machine guns + bombs.

HENLEY

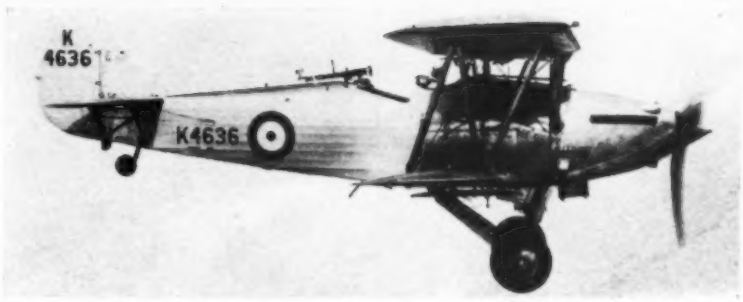
DUTIES: Target towing.
DESIGNING FIRM: Hawker Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Merlin II or III.
TOTAL H.P.: 1,030 at 16,250ft.
WING SPAN: 47ft. 10in.
TOP SPEED: 272 m.p.h.

HEREFORD

DUTIES: Bombing.
DESIGNING FIRM: Handley Page, Ltd.
NUMBER OF CREW: Three-four.
CONSTRUCTION: Metal.
POWER PLANT: 2 Napier Dagger.
TOTAL H.P.: 2,000 (approx.).
WING SPAN: 69ft. 4in.
ARMAMENT: Several machine guns + bombs

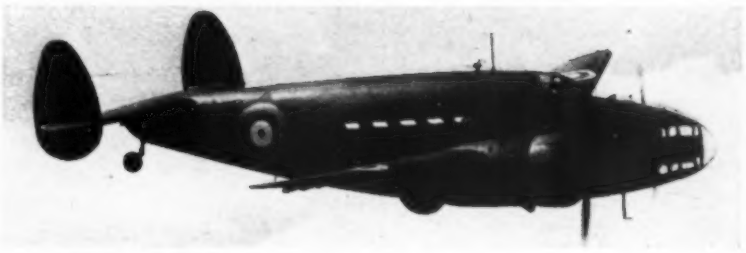
HIND TRAINER

DUTIES: Training.
DESIGNING FIRM: Hawker Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Kestrel V (derated).
TOTAL H.P.: 560.
GROSS WEIGHT: 4,650 lb.
WING SPAN: 37ft. 3in.
TOP SPEED: 185 m.p.h.
RANGE: 610 miles.
N.B.—The machine illustrated is the Hind bomber.



HUDSON

DUTIES: General reconnaissance and bombing.
DESIGNING FIRM: Lockheed Aircraft Corporation
NUMBER OF CREW: Three-four.
CONSTRUCTION: Metal.
POWER PLANT: 2 Wright Cyclone G.
TOTAL H.P.: 1,700 (approx).
WING SPAN: 65ft. 6in
ARMAMENT: Several machine guns + bombs



HURRICANE I

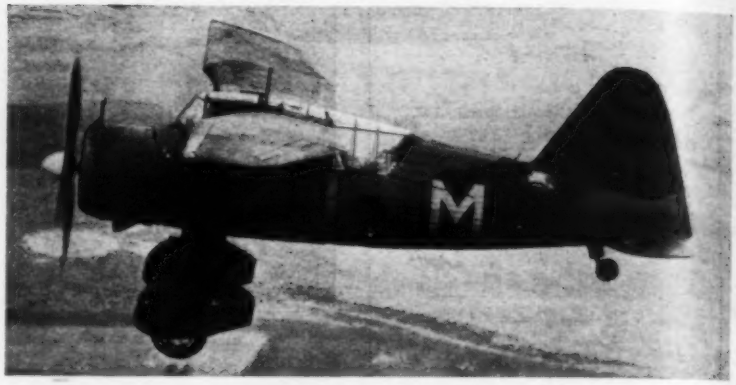
DUTIES: Fighting
DESIGNING FIRM: Hawker Aircraft, Ltd.
NUMBER OF CREW: One.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Merlin II or III.
TOTAL H.P.: 1,030 at 16,250ft.
GROSS WEIGHT: 6,000 lb.
WING SPAN: 40ft.
TOP SPEED: 335 m.p.h.
RANGE: 600 miles.
ARMAMENT: 8 machine guns.

LONDON II

DUTIES: Reconnaissance and bombing
DESIGNING FIRM: Saunders Roe, Ltd.
NUMBER OF CREW: Five-six.
CONSTRUCTION: Metal.
POWER PLANT: 2 Bristol Pegasus X
TOTAL H.P.: 1,830 at 6,250ft.
GROSS WEIGHT: 18,400 lb.
WING SPAN: 80ft.
TOP SPEED: 155 m.p.h.
RANGE: 1,000 miles.
ARMAMENT: 3 machine guns + bombs

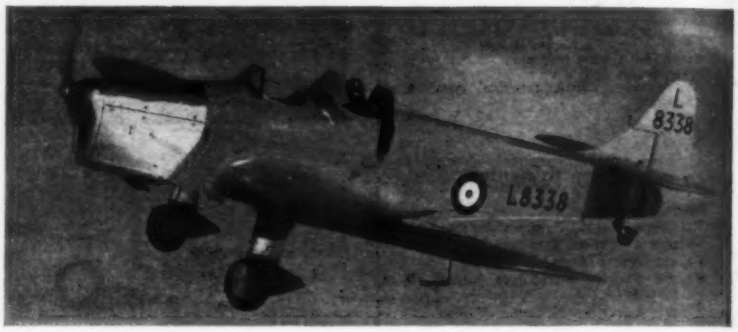
LYSANDER I

DUTIES: Army co-operation.
DESIGNING FIRM: Westland Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Mercury XII.
TOTAL H.P.: 890 at 6,000ft.
GROSS WEIGHT: 5,920 lb.
WING SPAN: 50ft.
TOP SPEED: 229 m.p.h.
RANGE: 600 miles.
ARMAMENT: 3 machine guns + bombs.
N.B. Lysander II (Perseus XII) has a slightly better performance.



MAGISTER

DUTIES: Training.
DESIGNING FIRM: Phillips and Powis Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Wood.
POWER PLANT: Gipsy Major.
TOTAL H.P.: 130 at sea level.
GROSS WEIGHT: 1,825 lb.
WING SPAN: 33ft 10in.
TOP SPEED: 145 m.p.h.
RANGE: 400 miles.

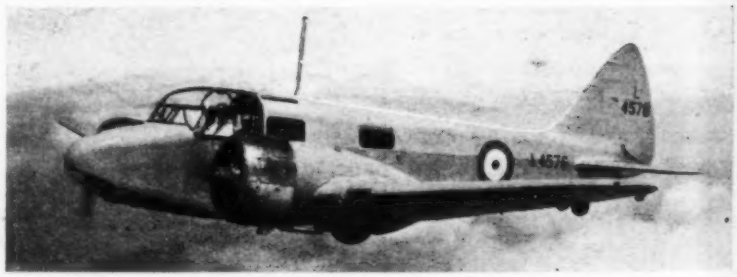


MASTER

DUTIES: Advanced training.
DESIGNING FIRM: Phillips and Powis Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Wood.
POWER PLANT: Rolls-Royce Kestrel XXX.
TOTAL H.P.: 600 at 14,250ft.
WING SPAN: 39ft.
TOP SPEED: 268 m.p.h.
RANGE: 440 miles.
ARMAMENT: 1-2 machine guns + bombs.

OXFORD

DUTIES: Training
DESIGNING FIRM: Airspeed (1934), Ltd.
NUMBER OF CREW: Three.
CONSTRUCTION: Wood.
POWER PLANT: 2 Armstrong Siddeley Cheetah X.
TOTAL H.P.: 710 at 7,000ft.
GROSS WEIGHT: 7,500 lb.
WING SPAN: 53ft. 4in.
TOP SPEED: 197 m.p.h.
RANGE: 860 miles.
ARMAMENT: 1 machine gun + bombs.

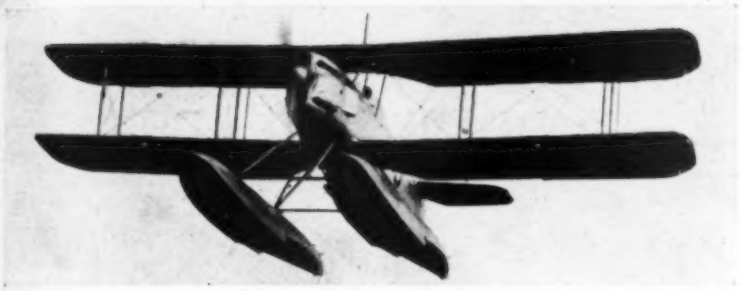


QUEEN BEE

DUTIES: Wireless-controlled target.
DESIGNING FIRM: De Havilland Aircraft Co., Ltd.
NUMBER OF CREW: None.
CONSTRUCTION: Wood and metal.
POWER PLANT: De Havilland Gipsy Major.
TOTAL H.P.: 130
WING SPAN: 29ft. 4in

ROC

DUTIES: Fighting for Navy.
DESIGNING FIRM: Blackburn Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Perseus.
TOTAL H.P.: 900 (approx.).
WING SPAN: 46ft.
ARMAMENT: Several machine guns.



SEA FOX

DUTIES: Reconnaissance for Navy.
DESIGNING FIRM: Fairey Aviation Co., Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Napier Rapier VI.
TOTAL H.P.: 395 at 6,000ft.
GROSS WEIGHT: 5,420 lb.
WING SPAN: 40ft.
TOP SPEED: 124 m.p.h.
RANGE: 446 miles.
ARMAMENT: 1 machine gun.

SHARK II

DUTIES: Torpedo-dropping, reconnaissance, bombing and spotting.
DESIGNING FIRM: Blackburn Aircraft, Ltd.
NUMBER OF CREW: Two-three.
CONSTRUCTION: Metal.
POWER PLANT: Armstrong Siddeley Tiger VI.
TOTAL H.P.: 810 at 6,400ft.
GROSS WEIGHT: 8,013 lb.
WING SPAN: 46ft.
TOP SPEED: 152 m.p.h.
RANGE: 575 miles.
ARMAMENT: 2 machine guns + torpedo or bomb.

SKUA II

DUTIES: Dive bombing and fighting for the Navy.
DESIGNING FIRM: Blackburn Aircraft, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Perseus.
TOTAL H.P.: 900 (approx.).
WING SPAN: 46ft. 2in
ARMAMENT: Several machine guns and bomb.

SINGAPORE III

DUTIES: Bombing and reconnaissance.
DESIGNING FIRM: Short Bros., Ltd.
NUMBER OF CREW: Five.
CONSTRUCTION: Metal.
POWER PLANT: 2 Rolls-Royce Kestrel IX and 2 Kestrel VIII.
TOTAL H.P.: 2,920 at 5,250ft.
GROSS WEIGHT: 27,500 lb.
WING SPAN: 90ft.
TOP SPEED: 145 m.p.h.
RANGE: 1,000 miles.
ARMAMENT: 4 machine guns + bombs.

SPITFIRE I

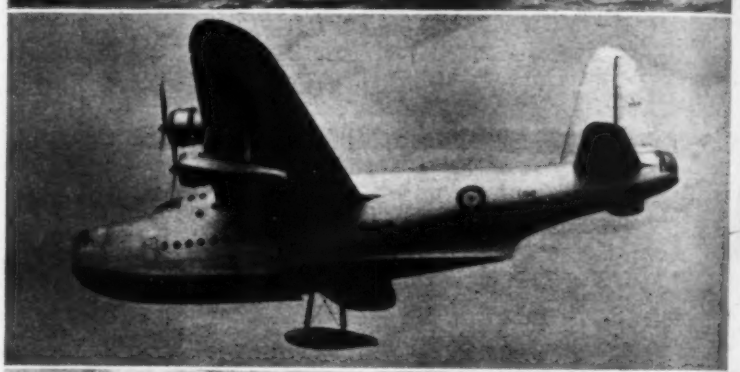
DUTIES: Fighting.
DESIGNING FIRM: Supermarine Aviation Works, Ltd.
NUMBER OF CREW: One.
CONSTRUCTION: Metal.
POWER PLANT: Rolls-Royce Merlin II or III.
TOTAL H.P.: 1,030 at 16,250ft.
WING SPAN: 36ft. 10in.
TOP SPEED: 362 m.p.h.
ARMAMENT: 8 machine guns.

STRANRAER

DUTIES: Reconnaissance and bombing.
DESIGNING FIRM: Supermarine Aviation Works.
NUMBER OF CREW: Five.
CONSTRUCTION: Metal.
POWER PLANT: 2 Bristol Pegasus X
TOTAL H.P.: 1,830 at 6,250ft.
GROSS WEIGHT: 19,000 lb.
WING SPAN: 85ft.
TOP SPEED: 165 m.p.h.
RANGE: 1,000 miles.
ARMAMENT: 3 machine guns + bombs.

SUNDERLAND I

DUTIES: Reconnaissance and bombing.
DESIGNING FIRM: Short Bros., Ltd.
NUMBER OF CREW: Six-eight.
CONSTRUCTION: Metal.
POWER PLANT: 4 Bristol Pegasus XXII.
TOTAL H.P.: 3,660 at 6,250ft.
GROSS WEIGHT: 45,700 lb.
WING SPAN: 112ft. 9½in.
TOP SPEED: 210 m.p.h.
RANGE: 1,670 miles.
ARMAMENT: 7 machine guns + bombs.



SWORDFISH

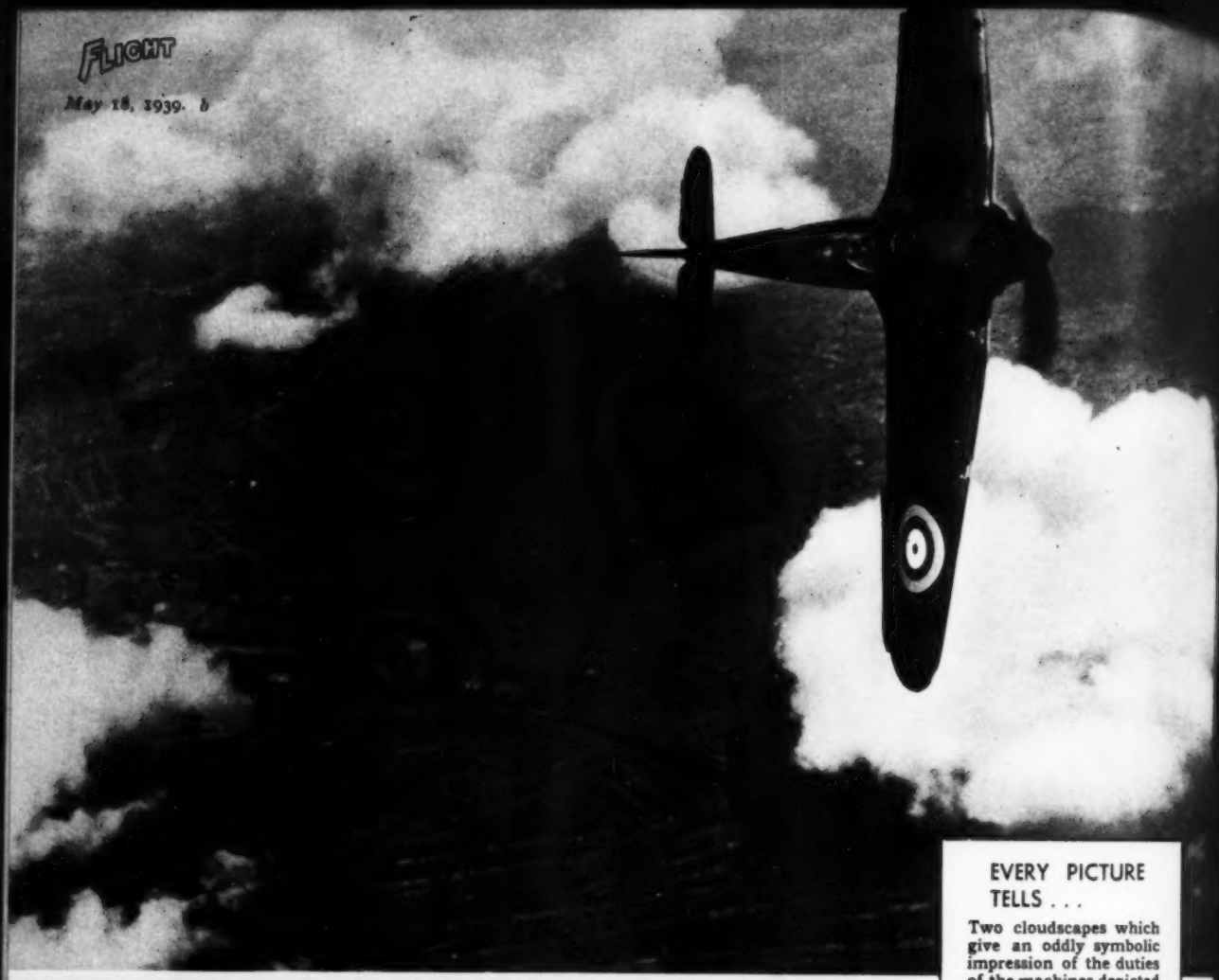
DUTIES: Torpedo dropping, bombing and reconnaissance for the Navy.
DESIGNING FIRM: Fairey Aviation Co., Ltd.
NUMBER OF CREW: Two-three.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Pegasus III.
TOTAL H.P.: 750 at 4,750ft.
GROSS WEIGHT: 7,720 lb.
WING SPAN: 45ft. 6in.
TOP SPEED: 154 m.p.h.
ARMAMENT: 2 machine guns + torpedo or bombs.

TIGER MOTH

DUTIES: Training.
DESIGNING FIRM: De Havilland Aircraft Co., Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Wood and metal.
POWER PLANT: De Havilland Gipsy Major.
TOTAL H.P.: 130.
GROSS WEIGHT: 1,825 lb.
WING SPAN: 29ft. 4in.
TOP SPEED: 109 m.p.h.
RANGE: 458 miles.

THE PEEL-OFF

Westland Lysander monoplanes of an R.A.F. Army Co-operation Squadron start a mock dive-bombing attack for "Flight's" chief photographer. Eight practice bombs may be seen outboard of the main bomb carriers (also used to carry supply canisters) beneath the stub wings.



EVERY PICTURE TELLS . . .

Two cloudscapes which give an oddly symbolic impression of the duties of the machines depicted—the Hurricane as an agile defender of the Metropolis and the Hampden as a purposeful carrier of swift retribution over long distances.

Below: "Flight" photograph.

VILDEBEEST IV

DUTIES: Torpedo dropping and bombing.
DESIGNING FIRM: Vickers-Armstrongs, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Perseus VIII.
TOTAL H.P.: 810 at 5,250ft.
GROSS WEIGHT: 8,500 lb.
WING SPAN: 49ft.
TOP SPEED: 156 m.p.h.
RANGE: 600 miles.
ARMAMENT: 2 machine guns + torpedo or bombs.

WALRUS II

DUTIES: Reconnaissance and spotting for the Navy.
DESIGNING FIRM: Supermarine Aviation Works.
NUMBER OF CREW: Three.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Pegasus VI.
TOTAL H.P.: 680 at 3,500ft.
GROSS WEIGHT: 7,200 lb.
WING SPAN: 45ft. 10in.
TOP SPEED: 135 m.p.h.
RANGE: 600 miles.
ARMAMENT: 2 machine guns + bombs.

WELLESLEY

DUTIES: Bombing.
DESIGNING FIRM: Vickers-Armstrongs, Ltd.
NUMBER OF CREW: Two.
CONSTRUCTION: Metal.
POWER PLANT: Bristol Pegasus XX.
TOTAL H.P.: 925 at 10,000ft.
GROSS WEIGHT: 11,100 lb.
WING SPAN: 74ft. 7in.
TOP SPEED: 220 m.p.h. (approx.).
RANGE: 1,880 miles.
ARMAMENT: 2 machine guns + bombs.

WELLINGTON I

DUTIES: Bombing.
DESIGNING FIRM: Vickers-Armstrongs, Ltd.
NUMBER OF CREW: Four.
CONSTRUCTION: Metal.
POWER PLANT: 2 Bristol Pegasus.
TOTAL H.P.: 1,800 (approx.).
WING SPAN: 86ft 1in.
ARMAMENT: Several machine guns + bombs.
N.B.—Also being built with Merlin and Hercules engines.

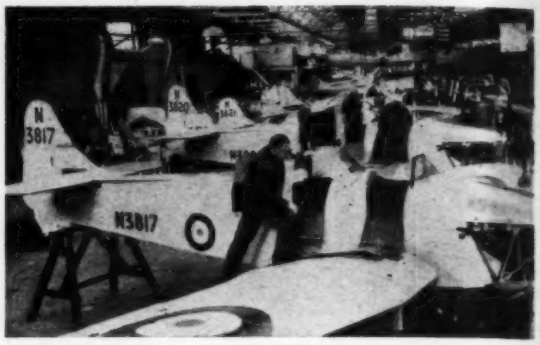
WHITLEY III

DUTIES: Bombing.
DESIGNING FIRM: Sir W. G. Armstrong-Whitworth Aircraft, Ltd.
NUMBER OF CREW: Five.
CONSTRUCTION: Metal.
POWER PLANT: 2 Armstrong Siddeley Tiger VIII.
TOTAL H.P.: 1,610 at 15,000ft.
GROSS WEIGHT: 24,000 lb.
WING SPAN: 84ft.
TOP SPEED: 215 m.p.h.
RANGE: 1,315 miles.
ARMAMENT: 5 machine guns + bombs

WHITLEY IV

DUTIES: Bombing.
DESIGNING FIRM: Sir W. G. Armstrong-Whitworth Aircraft, Ltd.
NUMBER OF CREW: Five.
CONSTRUCTION: Metal.
POWER PLANT: 2 Rolls-Royce Merlin IV.
TOTAL H.P.: 2,060 at 16,250ft.
GROSS WEIGHT: 25,000 lb.
WING SPAN: 84ft.
TOP SPEED: 245 m.p.h.
ARMAMENT: 5 machine guns + bombs.

MACHINES IN THE MAKING : The works views on this page give an idea of modern speed of production even a year ago, when the photograph on left, in Fairey's Stockport works, was taken. Below: Magisters being assembled at Reading.



THE ROYAL AIR FORCE TO-DAY

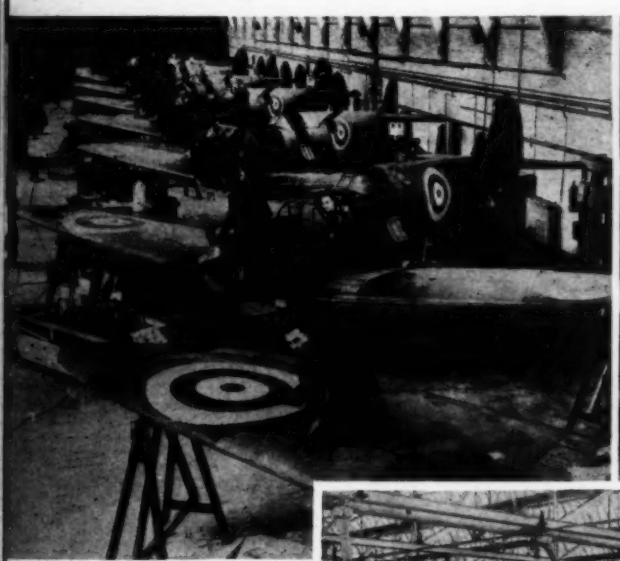
Its Equipment and Organisation : A Comprehensive Review

OF the quantities of aircraft supplied to, and ordered for, the R.A.F. we can say very little of a precise nature; of their quality we may write more precisely, for this has been demonstrated time and again and will be further emphasised next Saturday.

The photographs on this page convey only a slight idea of the immensity of our present production programme. Dozens of fighters, bombers and other types are being delivered every week, and machines which are the envy of other air forces are already beginning to make way for even more formidable types.

The remainder of this review—on the following 22 pages—has been planned to give some idea of the success of our new equipment in service with the R.A.F. *Flight*, with opportunities for sounding Service opinion, has become used to the expressions of pleasure and pride from pilots on the subject of their aeroplanes. On Saturday our readers will see what these machines can do.

The information given hereafter has been limited by a new series of official restrictions, but enough material is available to compile what we hope will prove an instructive tribute to the quality of Britain's military aeroplanes.



MORE PRODUCTION : Of the scores of Supermarine Spitfires (above) already delivered, a large percentage will be seen in action on Empire Air Day.

OUTPUT : Typifying the high-speed bomber carrying a comparatively light load and the slower "heavy-weight" type, the Bristol Blenheim (seen in production on the left) and the Armstrong-Whitworth Whitley (above) are both key types in the expanded R.A.F.

The R.A.F. Today:- FIGHTERS

A squadron of Supermarine Spitfire eight-gun fighters practising formation flying several thousand feet above Cambridgeshire.

TRAINING in fighter squadrons of the Royal Air Force is directed primarily towards efficiency in destroying enemy raiders, though in time of war certain squadrons would no doubt be charged with protecting our tactical reconnaissance (army co-operation) aircraft.

The fighter squadrons in this country are grouped under the Fighter Command, which has its headquarters at Stanmore, Middlesex, and is commanded by Air Chief Marshal Sir Hugh C. T. Dowding. Just how many of the 126 Home-based operational squadrons figuring in the new "censored" Air Force List are equipped with fighter aircraft is now regarded as an official secret. We do know, however, that in March the Fighter Command, embodying No. 11 (Fighter) Group, No. 12 (Fighter Group) and No. 22 (Army Co-operation) Group, controlled the following squadrons:—

Numbers 1 (F.); 2 (A.C.); 3 (F.); 4 (A.C.); 13 (A.C.); 16 (A.C.); 17 (F.); 19 (F.); 23 (F.); 24 (C.); 25 (F.); 26 (A.C.); 29 (F.); 32 (F.); 41 (F.); 43 (F.); 46 (F.); 53 (A.C.); 54 (F.); 56 (F.); 59 (A.C.); 64 (F.); 65 (F.); 66 (F.); 72 (F.); 73 (F.); 74 (F.); 79 (F.); 85 (F.); 87 (F.); 111 (F.); 151 (F.); 213 (F.); 501 (F.); 504 (F.); 600 (F.); 601 (F.); 602 (A.C.); 603 (F.); 604 (F.); 605 (F.); 607 (F.); 608 (F.); 609 (F.); 610 (F.); 611 (F.); 614 (F.); 615 (F.); and 616 (F.).

The symbol "F," of course, signifies fighter and "A.C." army co-operation, while the "C" stands for communications. Squadrons with numbers above 500 are units of the Auxiliary Air Force.

An essentially accurate list of aerodromes accommodating fighter and/or army co-operation units is: Castle Bromwich, Biggin Hill, Cardiff, Catterick, Church Fenton, Debden, Digby, Doncaster, Duxford, Farnborough, Filton, Hawkinge, Hendon, Hornchurch, Kenley, Northolt, North Weald, Odiham, Old Sarum, Turnhouse, Tangmere, Usworth, Wittering and Yeadon.

The Fighter Command, in addition to the squadrons mentioned, controls the Observer Corps which, manned by civilians, would inform Headquarters of the approach of enemy raiders.

There is still much controversy about the most desirable ratio of fighter to bomber squadrons. The Air Minister has made it clear that we are out to build up an extremely formidable aerial defensive organisation, though it is explained that our bombing force will not suffer in consequence. Contravening their own regulations that the size of orders for aircraft shall not be made public, the Air Ministry has announced that 1,000 Supermarine Spitfire single-seater fighters will be made in one new factory alone—that established by Lord Nuffield near Birmingham. The Nuffield factory is not yet in production, but for many months the Hawker and Supermarine works have been delivering Hurricanes and Spitfires respectively; some hundreds of these machines must by this time be in service.

362 m.p.h.

The Hurricane and Spitfire both correspond more or less to the same formula, and are believed to be without peer among the standard fighters of other world powers, though undoubtedly there are experimental prototypes both abroad and in this country carrying even more formidable armament and capable of even higher performances. These aircraft are for the greater part secret, certainly as far as this country is concerned—though rumours, stealing across the Channel and finding their way into the Continental Press, excite the imagination. Only a few weeks ago a French technical journal published a reference to a new English twin-engined fighter constructed by the Westland Company and capable of 430 m.p.h. Certainly the performances put up every day by the Hurricanes and Spitfires indicate that such speeds from fighters of the near future are by no means to be ridiculed. The Hurricane as now in use is capable of 335 m.p.h. at 17,500ft., and the Spitfire, which is rather smaller and lighter, reaches 362 m.p.h. at approximately the same height.

Both the Hurricane and Spitfire are low-wing cantilever monoplanes of metal construction, though the Spitfire is covered with smooth metal sheeting, whereas the Hurricane retains the fabric which characterised older fighters. This type of covering, used over an open girder framework, affords easier installation of, and access to, the complicated internal equipment, though performance may be handicapped.

Both the Hurricane and the Spitfire are surprisingly easy to fly, despite their exceptional performance and the fact

"Flight" photograph.

This unusual picture of a Hawker Hurricane formation reveals details of this formidable eight-gun fighter and gives an idea of the precision with which it can be flown in formation.

that the operational technique involved is something of an innovation to the Service. This is due not only to the installation of trailing-edge flaps (which increase the gliding angle and slightly reduce the landing speed), the use of a retractable undercarriage and, in the later versions, variable-pitch airscrews (which benefit take-off and certain aspects of performance), but to their extreme speed, which may cause the pilot to "black out" if he pulls out too sharply from a dive or attempts too tight a turn. Aerobatics, if attempted, must also be executed according to a revised technique. A loop, for instance, must be started at a much higher speed than hitherto, otherwise the pilot of one of these high-speed monoplanes may find his machine rolling unintentionally off the top.

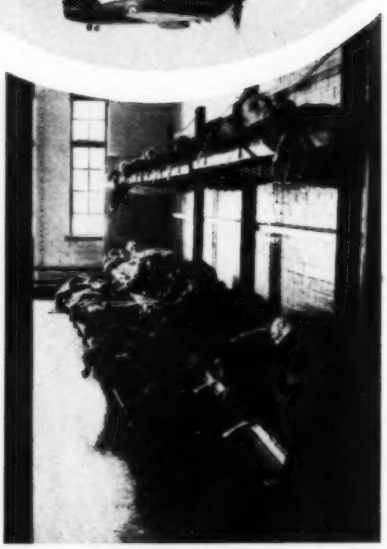
Considering that the pilot in the Hurricane and Spitfire is placed well aft behind the 1,030 h.p. Rolls-Royce Merlin engine, the view for fighting, formation flying and landing is not so bad as may be expected. This fact drew comment from Major de Seversky, the American pilot and military aircraft designer, who recently flew a Spitfire in this country.

The type of Rolls-Royce Merlin engine fitted to our two new single-seater fighters is a fully supercharged model (Mark II or III), which, as already stated, delivers a maximum output of no less than 1,030 h.p., this performance being attained at 3,000 revolutions per minute at a height of 16,250ft and at a boost pressure of +6¼ lb. sq. in. Despite its high power rating, the Merlin operates on the standard R.A.F. "87 octane" fuel. Most of the Hurricanes and Spitfires now have "ejector" exhaust systems which permit higher speeds than did previous types.

Equipment of the Hurricane and Spitfire includes a supply of oxygen for high-altitude flying (this is delivered to the pilot through a mask which also embodies a microphone for wireless communication); two-way radio; and comprehensive night-flying equipment.

Empire Air Day visitors who have been out of touch with Service aviation since last year will note next Saturday that camouflage has been applied much more extensively to our fighters. Normally this camouflage takes the form of shapeless green and brown patches applied to all the upper surfaces of the aircraft, the lower portions being finished either in matt black if the machine is a bomber (or one which may fly at night), or black and white in the case of some fighters. It may be assumed that the combinations of letters also carried on the fuselage denote the number of the squadron to which the aircraft belongs.

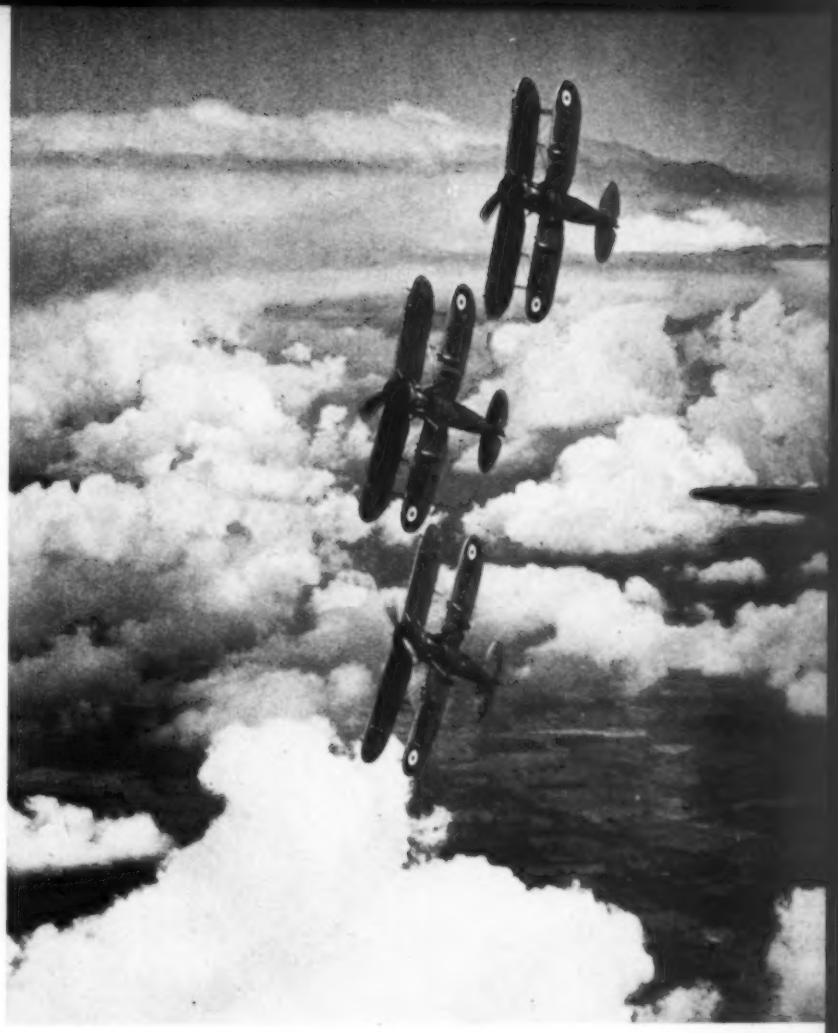
Fighter squadrons have their own radio frequencies and call-signs. The



"Flight" photograph.

"Flight" photograph.

The centre view shows pilots of an R.A.F. fighter squadron ready at a moment's notice to forsake the arms of Morpheus for the cockpits of their Hurricanes. Above is a Spitfire just before a night take-off and on the left are pilots of a Spitfire squadron racing for their machines on receipt of an alarm.



A flight of Gloster Gladiator four-gun biplane fighters disport themselves in an exhilarating setting.

latter can, on occasion, be quite amusing.

Armament of the Hurricane and Spitfire takes the form of eight belt-fed Browning machine guns of 0.303in. bore. These are mounted in the wing on each side of the fuselage, and fire clear of the airscrew arc. In this position synchronising gear is rendered unnecessary. The guns are heated for high-altitude fighting, are fired simultaneously by remote control from a button on the pilot's control column, and are "toed" inward to form a cone of fire, the streams of bullets verging at a specified distance in front of the aircraft. As the machines will usually fight in formations of at least three, it may be imagined how terrible their onslaught would be with twenty-four guns firing eight at a time at the rate of something like 1,200 rounds a minute each. People who have stood near one of these eight-gun fighters which has been firing its entire armament at the butts on the aerodrome say that the noise is not so much a "rat-a-tat" as a continuous jarring explosion.

The guns are aimed with the aid of a reflector sight near the pilot's windscreen.

Shell-guns

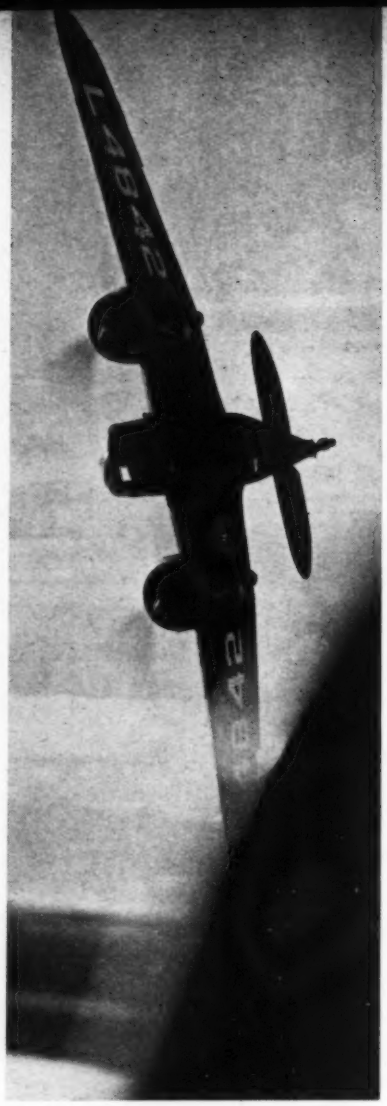
In view of the announcement that shell-firing automatic guns (*canons*) are being constructed in this country under licence from the French Hispano-Suiza concern, it is to be assumed that multiple machine guns will eventually be supplanted, though with their present armament the Hurricane and Spitfire are quite capable of dealing with any enemy bomber which is likely to cross our coast, and of dealing with it more effectively than could any other type of standard single-seater fighter now in use. These aircraft are, in fact, more formidable than the average Continental *canon* fighter.

The pros and cons of machine guns and shell-guns have frequently been set out in articles appearing in *Flight*. An installation of multiple high-speed machine guns firing small-bore ball ammunition is very deadly at comparatively short ranges, but the shell-guns now favoured (20-37 mm. bore) enable a fighter to keep out of range of a bomber's guns, assuming, of course, that the bomber does not sacrifice a very big percentage of its military load to heavy defensive armament. It is considered also that small-bore machine-gun ammunition is not sufficiently effective against machines built according to the latest principles of construction.

So far, we have made no mention of two successful biplane fighters which have been in use for some years. These are the Gloster Gauntlet and Gladiator, which may be distinguished from each other in that the Gauntlet is

The mask worn by this Hurricane pilot embodies a microphone and oxygen feeding device.

On the right a dozen Spitfires manœuvre with uncanny precision at a speed well over 200 m.p.h.



"Flight" photograph.

A potential twin-engined fighter is the Bristol Blenheim which is used principally as a bomber and strategical reconnaissance machine.

a "two-bay" machine (i.e., it has two sets of struts on each side of the fuselage), while the newer Gladiator has only one set. Other differences are in the undercarriage (the Gladiator has an amazingly clean single-strut type) and in the armament, which, in the Gladiator, takes the form of four machine guns, two in the fuselage synchronised to fire between the blades of the airscrew, and two under the lower wing. The Gauntlet has only two guns. With a Bristol Mercury IX engine of 840 maximum h.p., the Gladiator will do 250 m.p.h., while the Gauntlet is 20 or more miles an hour slower on the power of the earlier 645 h.p. Mercury VI.

A radically new type of fighter which will soon be appearing in R.A.F. squadrons is the Boulton Paul Defiant, a shapely, low-wing two-seater monoplane which supersedes the Hawker Demon in the two-seater fighter class. The Defiant carries its armament of multiple machine guns grouped in a battery in an amazing power-driven turret designed by the manufacturers of the aircraft.

This can be rotated at high speed, and permits, in conjunction with hinged fairings, a wide field of fire. It is presumed that the pilot has no guns, and that he will concentrate on manœuvring his machine in the most favourable position for his gunner. Obviously, the Defiant will be very useful for attacking formations of bombers, possibly flying ahead of them and at a lower level, permitting the gunner to fire upward under their noses, which are usually comparatively poorly defended.

The Defiant is of metal stressed-skin construction, and is fitted with a Rolls-Royce Merlin engine driving a three-bladed De Havilland variable-pitch airscrew. Those fortunate enough to see a Defiant on Empire Air Day will notice that the radiator is slung under the fuselage, much farther aft than usual.

Turreted armament, as installed in the Defiant, has met with some severe criticism from people who maintain that it could not be employed effectively under modern conditions of aerial combat, due to the limited time available to train the gun in view of the high angular velocities involved. However, extensive tests at the Aeroplane and Armament Experimental Establishment at Martlesham Heath appear to have convinced the Air Ministry that the system is well worth while.

Armour

A power-driven turret is of necessity a very complicated and somewhat delicate piece of mechanism, and in future designs we may see armour plating fitted round vital parts. Armour may also be applied to fighters in other places, notably round the nose and airscrew spinner of a machine with a liquid-cooled engine. The smooth curvature of the cowling will serve to deflect bullets fired rearward from a bomber.

So far there has been no announcement of a twin-engined fighter for the R.A.F. (excepting the Westland machine previously mentioned), though in the Bristol Blenheim we obviously have a machine with great potentialities as a multi-gun, multi-seater fighter.

In the single-seater category we may see both single- and twin-engined machines.

The Boulton Paul Defiant is our new standard two-seater fighter. It has a Merlin engine and a multi-gun powered turret

Forthcoming Events

MAY.

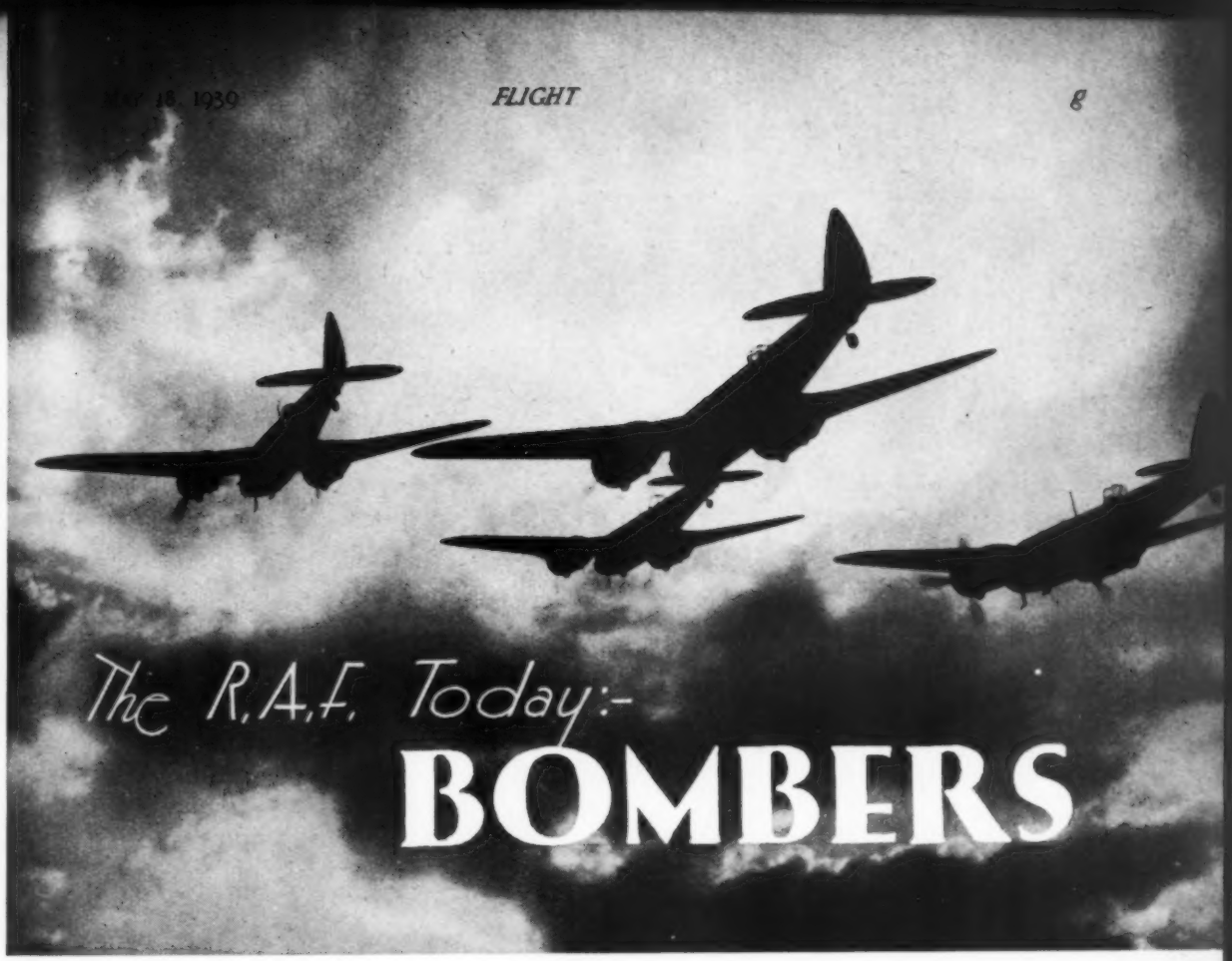
Sun., 14th-Sat. 20th. Polish Aero Club: Istus Gliding Contest.
Mon., 15th. "The High Ball"—Air League Dinner and Dance, Grosvenor House, London.
Tues., 16th. Aero Golfing Society: "Flight" Trophy, Wentworth.
Sat., 20th. Empire Air Day.
Thurs., 25th. R.Ae.S. Wilbur Wright Memorial Lecture by Dr. G. W. Lewis.
Sat., 27th. London-I.O.M. Race.
Mon. 29th. Manx Air Derby and Tynwald Race.

JUNE.

Sat., 10th. Brooklands Flying Club "At Home."
Sat., 17th. Official opening of Derby Municipal Airport (Burnaston) by Sir Kingsley Wood.
Wed., 21st. Aero Golfing Society: Jubilee Cup, Berkshire Golf Club.
Sat., 24th. Royal Air Force Garden Party.

JULY.

Sat., 1st. South Staffordshire Aero Club: Walsall Air Display.
Sat., 1st. Opening of Grangemouth (Scotland) Airport by Lord Trenchard.
Sat., 8th. Official Opening of Birmingham Airport (Elmdon) by H.R.H. the Duchess of Kent.
Sat., 8th-Sun., 16th. National Gliding Contests, Great Hucklow.
Sat., 8th-Sun., 23rd. Brussels Aero Show.
Sat., 15th. Gosport Reunion, Brooklands.
Sat., 15th-Mon. 17th. Deauville Air Rally.



The R.A.F. Today:- BOMBERS

A symbolic view of Bristol Blenheims.

THE last "unexpurgated" *Air Force List* included seventy-two bomber squadrons of which numbers 6, 8, 11, 14, 27, 30, 39, 45, 47, 55, 60, 84, 113, 211 and 223 were stationed abroad, coming under the Middle East, Palestine and Trans-Jordan, Iraq, India, Mediterranean, Aden or Far East Commands. In this country fifty-seven units made up our bombing force. These were numbers 7, 9, 10, 12, 15, 18, 21, 34, 35, 37, 38, 40, 44, 49, 50, 51, 52, 57, 58, 61, 62, 63, 75, 76, 77, 78, 82, 83, 88, 90, 97, 98, 99, 101, 102, 103, 104, 105, 106, 107, 108, 110, 114, 115, 139, 142, 144, 148, 149, 150, 166, 185, 207, 214, 215, 218 and 226 squadrons, and were all grouped under the Bomber Command which, centring on Uxbridge, Middlesex, and controlling Nos. 1, 2, 3, 4 and 5 (Bomber Groups) and No. 6 (Auxiliary Group).

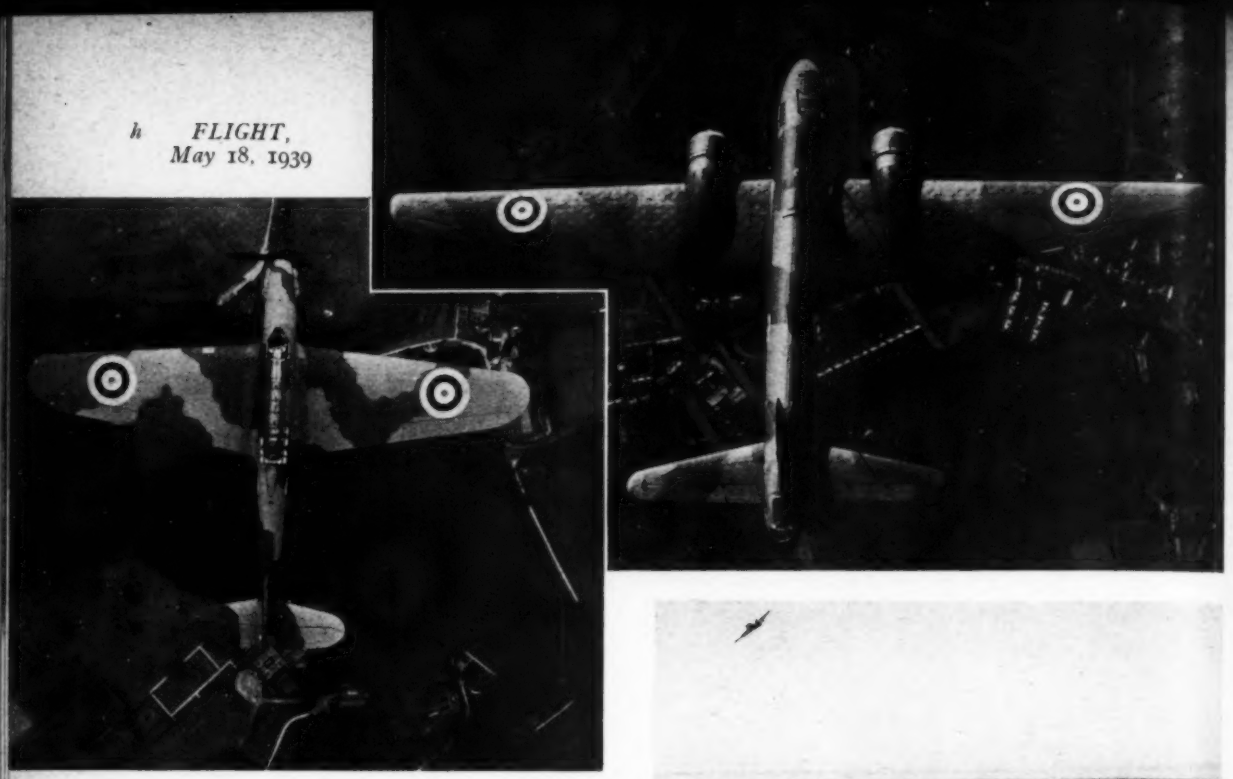
A list of stations at which bombing aircraft might be seen functioning (some are open on Empire Air Day) was an impressive one even as given in the March issue of the *Air Force List*: Abingdon, Andover, Bassingbourn, Bicester, Boscombe Down, Cranfield, Dishforth, Driffield, Feltwell, Finningley, Harwell, Hemswell, Honington, Hucknall, Leconfield, Linton-on-Ouse, Marham, Mildenhall, Scampton, Stradishal, Thornaby, Upper Heyford, Upwood, Waddington and Wyton.

The functions of bombers are quite clear-cut: they must adopt all possible means to ensure that their bombs are dropped on a set target and must return home as fast as possible and with the minimum risk so that they may bomb another day.

The bombing aeroplane is often described as being, in effect, a long-range gun. It is used in the R.A.F. in various calibres, and the range of each type can usually be varied in accordance with the weight of explosives carried.

As in the case of fighters, all our newer bombers are monoplanes of exceptional efficiency. They range from the single-engined Fairey Battle and Vickers Wellesley to much larger twin-engined machines like the Handley Page Hampden, Vickers Wellington, Armstrong Whitworth

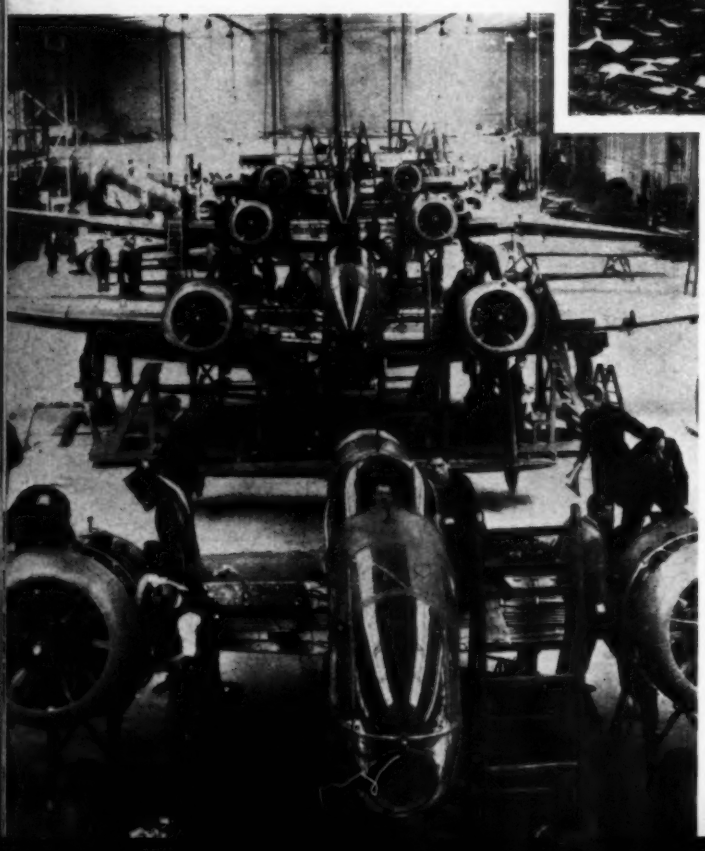
Long-distance formation flights under varying weather conditions are part of the training duties of a bomber squadron as illustrated by this fine impression of Bristol Blenheims. *"Flight" photograph.*



A Fairey Battle (left) and a Vickers Wellington show in a striking fashion the effectiveness of their camouflage markings.

On the right a Fairey Battle turns after releasing practice bombs on a target at a typical Armament Training Station of the R.A.F.

(Below) Bomber production : H.P. Hampdens, capable of 265 m.p.h., seen in the final assembly stage at the assembly plant at Radlett. The Hampden has two Bristol Pegasus XVIII engines with two-speed superchargers.

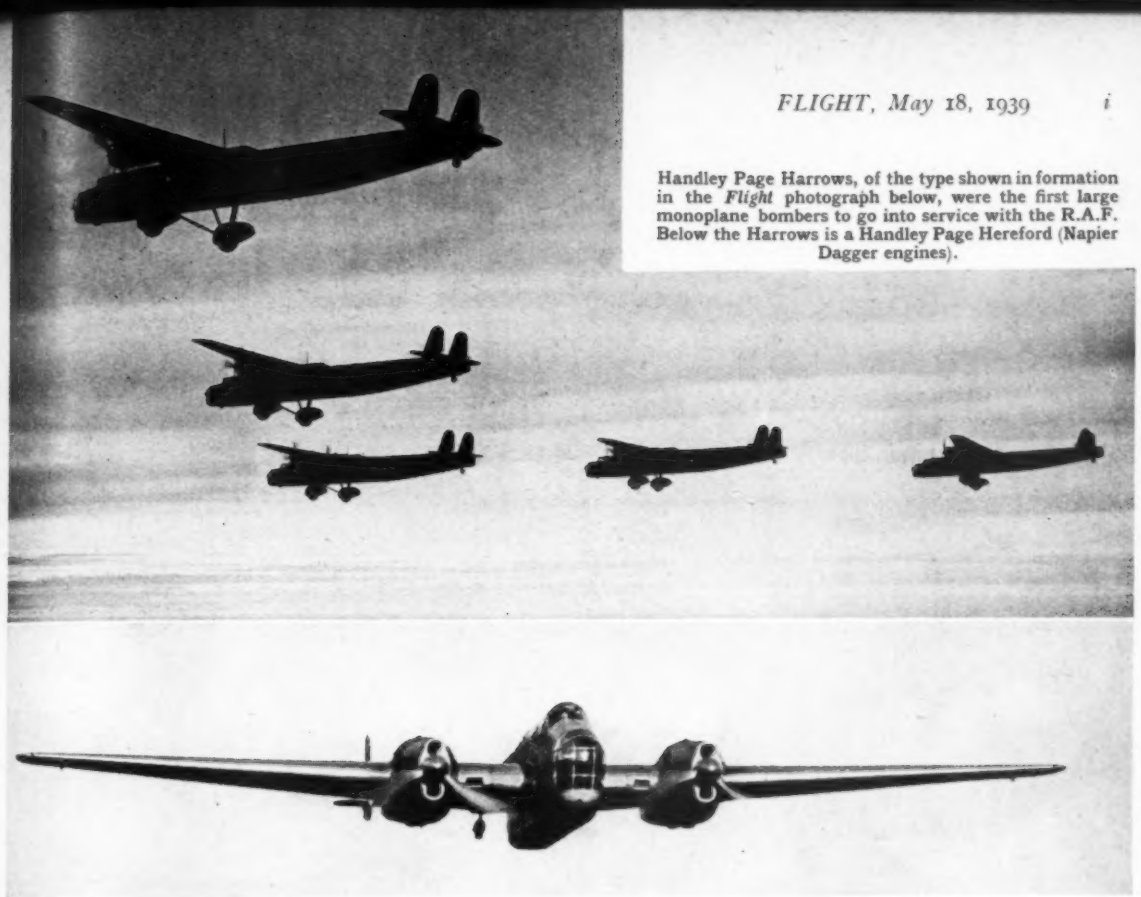


Whitley and Handley Page Harrow, and many squadrons are equipped with the Bristol Blenheim, a comparatively small, twin-engined type of extremely high performance.

Squadrons equipped with Fairey Battles practise the low-level, high-altitude, and diving varieties of bombing attack. The first form entails low flying at high speed, the bombs being released without the aid of the bomb sight, which is reserved for level attacks from high altitudes. In dive bombing the bomb is released by the pilot, who puts his machine into a dive for the target and releases after having made due allowance for wind and the pull of gravity on the projectile.

Fitted with a single Rolls-Royce Merlin II or III engine, the Battle has a top speed of 257 m.p.h. at 16,000ft., carrying a disposable load of 4,125 lb. It can function at heights up to 25,000ft. or more, the crew of two or three being housed under a long cockpit enclosure. Equipment includes wireless (mounted in a flexible crate in the rear of the fuselage with remote control from both cockpits), night-flying gear, and oxygen for high-altitude work. The bomb load is stowed in the wings, the openings normally being covered with trap-doors. Unlike the twin-engined types in service, the Battle has a prone position for the bomb aimer instead of a seat.

There is a Browning gun fixed in the wing for the



Handley Page Harrows, of the type shown in formation in the *Flight* photograph below, were the first large monoplane bombers to go into service with the R.A.F. Below the Harrows is a Handley Page Hereford (Napier Dagger engines).

use of the pilot and a Lewis gun on a shielded mounting at the rear of the cockpit enclosure.

Next in the size scale to the Battle is the twin-engined Bristol Blenheim, which is smaller in overall dimensions than the single-engined Vickers Wellesley, a Pegasus-engined monoplane used extensively for "general-purpose" work in the East. The Wellesley, incidentally, is basically similar to the specially prepared machines which, flown by pilots of the Long-Range Development Unit, succeeded in breaking the world's long-distance record last year. Two machines of the formation of three flew 7,162 miles non-stop from Ismailia to Port Darwin, Australia. The bomber Wellesley, by the way, carries its bombs in strange streamline containers under the wing.

Fastest of the bombers at present in service, the twin-engined Bristol Blenheim is used in two forms. The earlier, or "short-nosed," type has a top speed of 285 m.p.h. and a range of 1,125 miles, whereas the newer "long-nosed" version, which has better facilities for navigating, bomb aiming, etc., is 10 m.p.h. faster and has a range of 1,900 miles.

The secret of the vastly improved range of the new machine lies chiefly in the use of fuel of 100-octane value for take-off. This enables each of the Mercury VIII engines to develop 920 h.p., so that the machine can lift a much greater load of petrol. For normal cruising the pilot switches over to his main tanks of "87 octane."

The Blenheim carries a crew of three, consisting of a pilot, a bomb-aimer-navigator and a wireless-operator-gunner. Armament, in addition to a bomb load carried in the lower part of the fuselage, is two machine guns, one fixed in the wing for the use of the pilot and the second installed in a semi-retractable power-driven turret on top of the fuselage. The bomb fuses, as in all our current types of bombing aircraft, are set and released by electrically operated gear.

Equipment includes not only two-way wireless, night-flying gear and formation-keeping lights, oxygen, and, if necessary, an automatic pilot, but a camera (optional) and a collapsible dinghy as an additional safeguard for over-water operation.

The wireless (W/T) installation is just behind the gun

The new versions of the Armstrong-Whitworth Whitley, (Marks IV and V) have Rolls-Royce Merlin engines in place of the radials of the earlier Marks. The Whitley IV is shown on the right without its nose and tail gun turrets.

A number of R.A.F. bomber squadrons are stationed abroad. Here is a striking "pose" by the machines and personnel of the R.A.F. station at Heliopolis. This picture was taken last year, before re-equipment.

turret and is arranged so that the operator is within easy reach of the receiver, which he controls with his left hand when seated in the turret. Full transmission and reception is provided, with intercommunication between the pilot and air gunner or bomb-aimer. Either a fixed or a trailing aerial can be used and the accumulators, motor generator, smoothing unit, starter, transmitter and receiver are all mounted in crates fitted in sliding frames for easy and rapid removal when required. Telephone and microphone points are provided for each member of the crew and remote controls for the radio installation are included for the pilot up in the nose.

The navigation equipment includes a compass, chart board, Very signal pistol (this fires down a tube through the floor), an Aldis signalling lamp and tail drift sight.

Following standard Service practice in bombing aircraft, the pilot wears a seat-pack type of parachute which is permanently attached, whereas the more active members of the crew have a different type of harness embodying two stainless-steel hooks over the chest portion to which the pack, normally stowed in a container on the walls of the fuselage, may quickly be clipped.

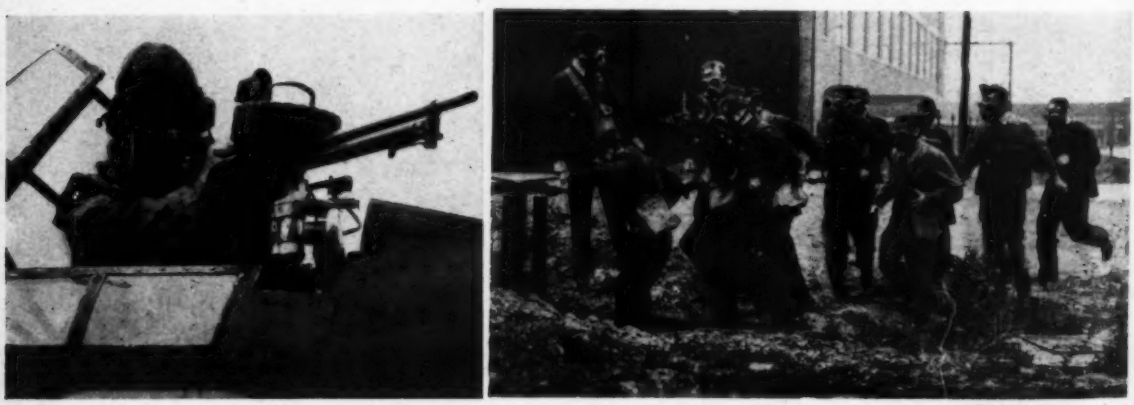
Larger than the Blenheim and fitted with more powerful engines of the Bristol Pegasus series, the Handley Page Hampden and Vickers Wellington twin-engined bombers are being delivered to squadrons at a very creditable rate. The Hampden, which was described in great detail in *Flight* of May 4, 1939, is of very striking appearance, the rear portion of the fuselage abruptly becoming a boom for carrying the tail. This means that practically all the Service equipment is grouped in the forward box-like portion and that the field of fire from the rear guns is correspondingly improved. Actually four machine guns are installed and the main bomb load is stowed internally, though additional bombs may be carried on external racks under the outer wings.

In addition to the equipment mentioned in connection with the Blenheim, the Hampden carries direction-finding gear (the loop aerial is retractable), large chutes for releasing parachute flares, flame floats for use over the sea, and, for the greater comfort of the crew, a lavatory and cabin-heating arrangements.

Students of aerodynamic design will have an opportunity on Empire Air Day of studying the Handley Page leading-edge slots and slotted flaps which contribute to the excellent performance of the Hampden. Fitted with a pair of two-speed supercharged Bristol Pegasus XVIII engines, driving constant-speed airscrews, the machine has a top speed of 265 m.p.h.

Differing widely in design from the Hampden, the Vickers Wellington is built on the "geodetic" principle, employing curved diagonal members. This remarkable type of structure (exclusive to Great Britain) permits the machine to carry an extraordinarily big bomb load for a machine of its size for a very long distance. Defensive armament is installed in power-driven turrets in the nose and tail and, due to clever design, the bombs are stowed internally, whereas in the geodetic-built Wellesley already mentioned they are carried outside the structure.

As the type has been in service for a longer period than the Hampden and Wellington, the Armstrong-Whitworth Whitley bomber will figure more prominently on Empire Air Day. The Whitley is a large and business-like mid-wing monoplane, with nose and tail gun turrets and a retractable "dustbin" amidships. Its equipment includes practically all the items already mentioned and its top speed varies from 215 m.p.h. to 245 m.p.h., according to the type of engine fitted. Most of the Whitleys seen will be of the Mark III variety with two-speed supercharged 14-cylinder Siddeley Tiger radials, but a new version, capable of 245 m.p.h. and known as the Whitley IV, will have Rolls-Royce Merlin water-cooled units. An even later type, using a more recent model of the Merlin, is also on order. The R.A.F. has also a number of Handley Page Harrow high-wing monoplane bombers which made way in the Handley Page works for the Hampdens.



"Flight" photographs.

On the left the rear gunner in a Fairey Battle bomber demonstrates how he would use his weapon under the shelter of the hinged portion of the cockpit enclosure. On the right is an air raid exercise by ground personnel of a bomber unit.

"Flight" photograph.

Westland Lysander army co-operation monoplanes about to dive through the clouds.

The R.A.F. To-day:

ARMY CO-OPERATION

LIKE most difficult jobs the work of army co-operation is exceptionally interesting. It is a highly specialised task, and airmanship represents only a small fraction of the skill demanded.

Turning again to our somewhat dated, but only available, guide—the March issue of the Air Force List—we find that apart from two Auxiliary "A.C." units—Nos. 602 and 614—there are twelve squadrons listed—Nos. 2, 4, 5, 13, 16, 20, 26, 28, 31, 39, 53 and 208, of which Nos. 5, 20, 28, 31 and 208 are stationed abroad.

An outline of the work of a typical army co-operation squadron takes in the duties of tactical reconnaissance, spotting for the artillery, attacking ground targets with bombs and machine guns, dropping supplies by parachute, and providing transport for Army staff officers. The squadrons in wartime would probably have to operate from advanced aerodromes; in fact, it is considered that they would have to change their operational bases so often that they are made more or less self-contained, having quite an elaborate collection of road transports.

For operation from confined spaces a specialised type of aircraft is desirable, and the standard single-engined army co-operation machine of the R.A.F.—the Westland Lysander—is particularly apt at getting in and out of small aerodromes. The Lysander is a high-wing monoplane of entirely unorthodox design. The pilot (who does all the spotting and observing in addition to operating the camera) and the rear gunner (who is a sort of aerial sentry) are accommodated under a delightfully comfortable transparent cockpit enclosure from which they can obtain an almost unrestricted view in essential directions.

The Lysander's remarkable take-off and landing characteristics are largely due to the Handley Page leading-edge slots and slotted flaps, though another contributory factor to its quick get-away is the high power (over 800 h.p.) delivered by the Bristol Mercury XII or Perseus XII engine for take-off. Incidentally, army co-operation units are among the first to receive the new sleeve-valve Bristols, the easy maintenance of which will be a boon when the squadrons are operating far afield.

Equipment of the Lysander includes two fixed machine guns (mounted in the "spats" of the undercarriage, the ammunition being fed down the legs of the unique fixed "horseshoe" undercarriage), bomb racks (fitted on small stub wings which can be fixed to the undercarriage), the latest type of Service camera, two-way wireless, night-flying equipment, a free gun in the rear cockpit, and a retractable hook for picking up messages from ground troops. When supplies are to be dropped they are put in cylindrical containers with parachutes attached. These are suspended from the bomb racks, and are fitted with readily replaceable percussion heads of duralumin. They can carry 124 lb. of food apiece. In certain cases pack-type containers would be used instead.

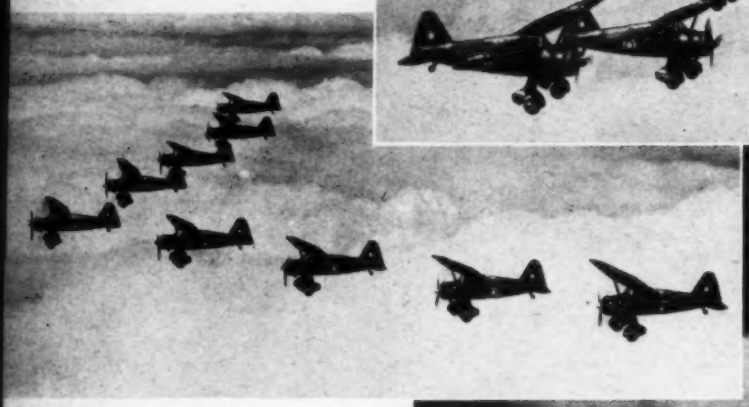
Despite its heavy load the Lysander can take off or land on a football pitch, but let us explain for the benefit of visitors who will see Lysanders on Empire Air Day that a formation take-off may be deliberately protracted.

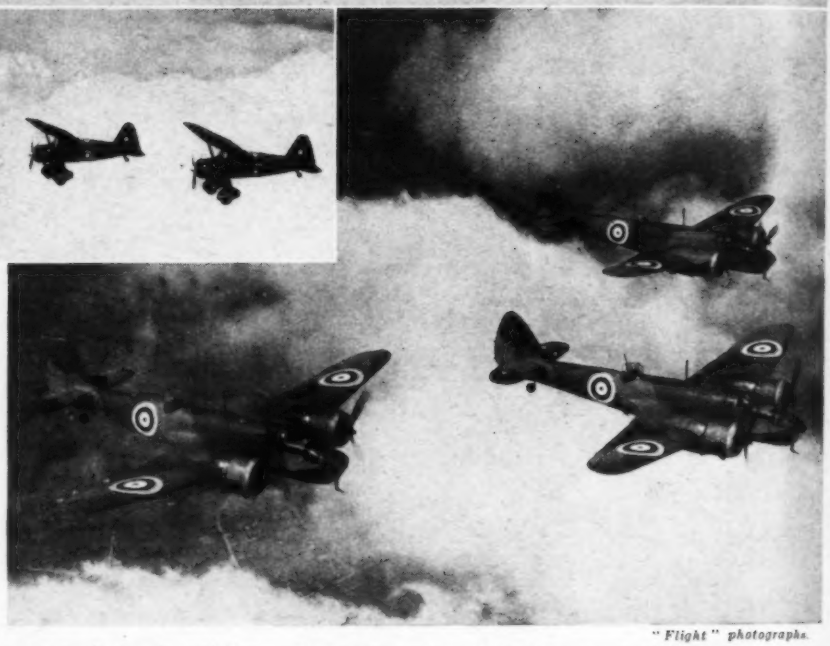
The Lysanders are not "aerobatted" by squadron

Message picking-up, as demonstrated by this Lysander, is usually referred to in the Service as "M.P.U." The hook is normally stowed in the bottom of the fuselage.

"Flight" photograph.

Credit for the fine Lysander formations shown in the views on the right and immediately below may not be given in view of new Air Ministry regulations.





"Flight" photographs.

On the right is a flight of long-nosed Bristol Blenheims of an army co-operation unit. Just after this photograph was secured the machines dived through the clouds at over 300 m.p.h.

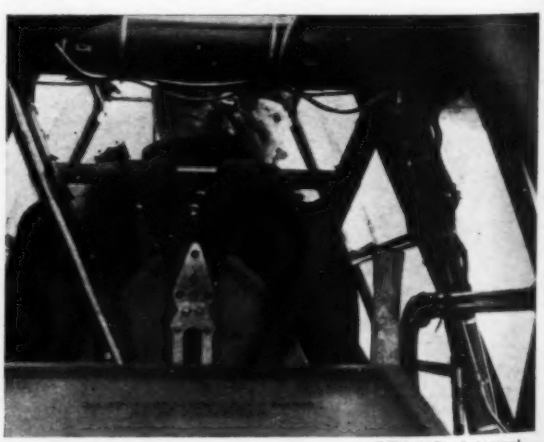
pilots, but thanks to their three machines guns and slow-flying qualities would prove tough nuts to crack in an aerial combat.

The Lysander is not intended for high-speed reconnaissance over long distances (though its top speed of 230 m.p.h. and its normal range of 600 miles do it great credit in view of its other outstanding features), and a second type of machine is being issued to certain Army co-operation units for this work—the new long-nosed version of the Bristol Blenheim twin-engined high speed monoplane bomber fitted with two Bristol Mercury VIII engines. This new version has tankage for a range of about 1,900 miles, but 100-octane fuel must be used to secure the higher take-off output (920 h.p.) required. The maximum speed in level flight at about 15,000ft. is 295 m.p.h., and in comparison with the standard type of short-nosed Blenheim the facilities for navigating, bomb-aiming, photography and survey are considerably improved thanks to the improved accommodation provided by the revised nose.

A small number of the latest type of jump-start Autogiros is being delivered for army co-operation work, mainly of an experimental nature. An earlier type of Autogiro known in the Service as the Rota indicated that the peculiar qualities of such aircraft might well be used in war time, particularly for liaison work, and for the transport of staff officers.

The technical interest to be found in an army co-operation squadron is, as will be found on Empire Air Day, by no means confined to the aircraft. There are, for example, numerous motor transport vehicles and various types of wireless apparatus, not to mention the cameras, supply containers, and other items of the squadron's stock in trade.

Fixing supply containers to the bomb carriers of a Lysander.

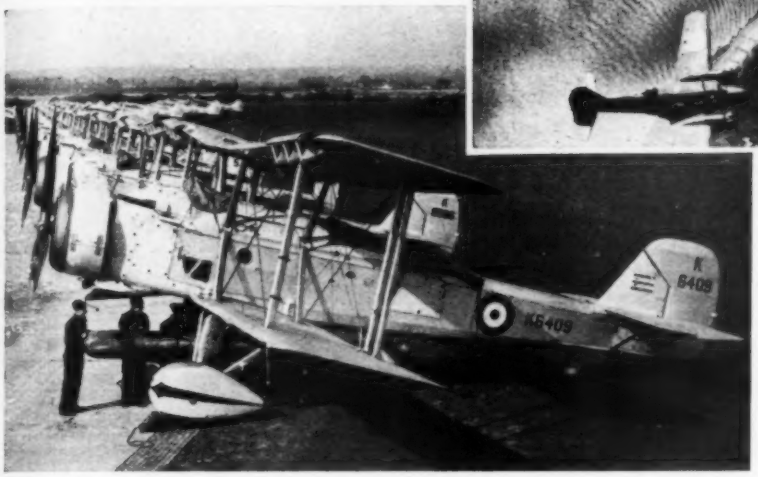


"Flight" photograph.

What the gunner sees : The pilot of a Westland Lysander.

The R.A.F. To-day:

COASTAL DEFENCE



On the left is a reassuring line-up of Vickers Vildebeest IV torpedo bombers. In the *Flight* photograph above, Avro Anson general reconnaissance machines (actually belonging to the Coast Artillery Co-operation Unit) head inland after "a job of work."

THIS brief discussion of the coastal defence organisation of the R.A.F. will, for the sake of convenience, include the large shore-based flying boats, which are used for open-sea reconnaissance work and patrol. It does not include the Fleet Air Arm units which, when shore-based, are also administered by the Coastal Command. The Air Officer Commanding-in-Chief of this Command is Air Marshal Sir Frederick W. Bowhill. The Command is responsible for three distinct types of squadron: general reconnaissance units of two types (one equipped with landplanes and the other with flying boats); and torpedo bomber squadrons. Coastal defence squadrons of the R.A.F. abroad use flying boats and torpedo bombers. At the moment our landplane "G.R." squadrons are equipped with the Avro Anson—the first monoplane to go into large-scale service with the R.A.F. The Anson, although some years old, is still extremely popular among Service pilots and maintenance personnel, and has the usefully high top speed of 188 m.p.h. Its equipment includes a variety of marine gear such as a collapsible dinghy and distress signals, sea markers and flame floats. Wireless is an essential part of its Service load, and a light bomb load can be carried for attacking submarines and small surface craft.

The only subsequent G.R. landplane so far announced by the Air Ministry is the Lockheed Hudson, one of two types of aircraft acquired from America. Essentially similar to the commercial Lockheed 14, the Hudson is fitted with two Wright Cyclone engines. Its comparatively roomy fuselage should mean high efficiency for the duties of long-range reconnaissance, patrol and convoy work, and obviously the machine could carry a heavy bomb load, or, perhaps, a torpedo.

Details of performance are not available, but one version of the commercial "14" is capable of something like 260 m.p.h.

Of the several general reconnaissance squadrons equipped with flying boats a number have already received the Short Sunderland—the largest machine employed by the R.A.F. The Sunderland is a modified development of the commercial Empire boat and is fitted with four Bristol Pegasus XXII engines giving no less than 1,010 h.p. each for take-off. A top speed of 210 m.p.h. is attainable and the normal cruising range is 1,670 sea miles. On a delivery flight to Singapore one Sunderland flew from Gibraltar to Malta (1,200 miles) at an average speed of 177 m.p.h.

There are two decks in the Sunderland and everything is arranged so that the machine is as near as possible self-contained. There are officers' quarters and bunks, elabor-

"*Flight*" photograph.

A unique "shot" taken during a turn from the bow cockpit of a Supermarine Stranraer flying boat operating off the East Coast.

"*Flight*" photograph.

The American Lockheed Hudson, seen here minus its turret, is a general reconnaissance type. This machine is being flown by a Martlesham test pilot.

"Flight" photograph.

The Supermarine Stranraer is a quite exceptionally pleasant flying machine as demonstrated by pilots of a Felixstowe G.R. squadron. The Saro London II (below) is sturdy, comfortable and seaworthy.

ate navigation facilities, accommodation for an engineer and wireless operator, quarters for the crew, a galley, a workbench, and stowage for an imposing array of marine gear, including drogues (to facilitate handling on the water) and collapsible dinghies. In the bow and at the stern are power-driven gun turrets and amidships are two further gun positions, though these are of the manually worked variety.

The majority of the flying boats units still have craft of an older, but nevertheless extremely useful, type. These machine are the Short Singapore III, with four Rolls-Royce Kestrel engines and a top speed of 145 m.p.h.; the Saunders Roe London, a sturdy boat using two Bristol Pegasus engines and having a slightly better performance than the Singapore; and the Supermarine Stranraer, which has the same power plant as the London but has rather reduced accommodation and an improved performance, the top speed being 165 m.p.h. All these boats carry an armament of at least three machine guns and when used for bombing can transport a heavy projectile load. Although they have stowage for a torpedo this is only for transport purposes and the projectile is not released against hostile shipping.

The coastal defence torpedo bomber squadrons are, for the time being, equipped with Vickers Vildebeest biplanes, most of which have Bristol Pegasus engines, though some—of the Mark IV variety—have the Bristol Perseus VIII sleeve-valve power plant. These machines can handle either a 21in. torpedo or a heavy load of bombs, or can, if need be, undertake reconnaissance duties.

Torpedo attacks would normally be made *en masse*, but the precise nature of the tactics favoured in official circles is secret.

A torpedo machine attacks by diving—usually at rather more than 200 m.p.h.—from a considerable height, flattening out when a few feet from the water and releasing its "tinfish" at ranges of up to 1,000 yards, thereupon climbing sharply and absenting itself from the vicinity in the quickest possible time. To deal with torpedo bombers and dive bombers, modern naval craft are armed with multiple-barrelled pom-pom guns and batteries of machine guns.

Pilots undergo a course at Gosport, where they are taught to judge height above the water accurately enough to ensure that the torpedo is not broken on impact.

The stately take-off of a Short Sunderland from Felixstowe under the urge of 4,040 h.p.

"Flight" photograph

The R.A.F. To-day:

TRAINING

IT is generally agreed that the pilots now being turned out by the R.A.F. Flying Training Schools are the best ever. This is due to a very highly organised training system and the exceptional qualifications of the instructional personnel.

The training of an R.A.F. pilot takes approximately ten months, though not all of this period is spent at a Flying Training School. First the pupil has a spell at a civil elementary flying school, which he leaves holding a civilian "A" licence. Then he goes on to Uxbridge for drill and other disciplinary instruction and thence to one of the several "F.T.S.s" dotted about the country.

At the F.T.S. the budding pilot does blind flying, night flying, formation work and makes lengthy cross country flights.

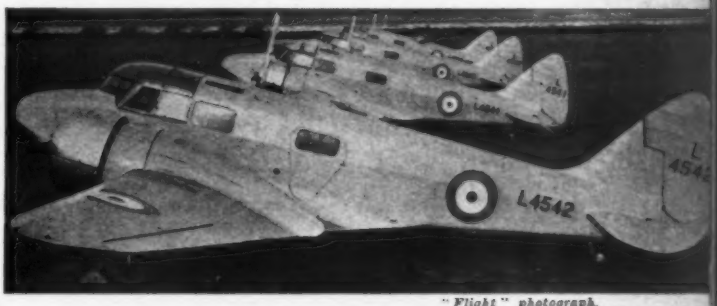
Apart from the F.T.S. there is a number of training units in the country, including Air Armament Schools, Air Observer's Schools, a School of Army Co-operation, a School of Air Navigation, an Anti-Gas School, a School of Aeronautical Engineering, Electrical and Wireless Schools, the Central Flying School, the School of Naval Co-operation, the School of Photography, the School of General Reconnaissance, the School of Physical Training, the Equipment Training School, the School of Clerks, Accounting, Schools of Technical Training (Apprentices), Schools of Technical Training (Men) and a number of Armament Training Stations.

Very large numbers of new monoplane aircraft are going into service to supplement, and eventually to replace entirely, some of the older biplane types such as the Hawker Hart Trainer, Audax and Hind and the Avro Tutor. Parallel deliveries are being made of the outstandingly successful De Havilland Tiger Moth biplane for *ab initio* work. The standard monoplane for elementary training in the Service is the Miles Magister a low-wing tandem two-seater of wooden construction, fitted, like the Tiger Moth, with a De Havilland Gipsy Major engine of 130 h.p.

Phillips and Powis Aircraft, Ltd., who are responsible for the Magister are also in large scale production with the Master, a larger and much more powerful two-seater for advanced training. Fitted with a Rolls-Royce Kestrel XXX engine specially developed and rated for training duties the Master has a top speed of just under 270 m.p.h. and is intended primarily for instruction in the handling

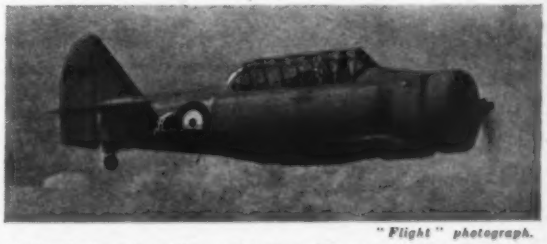
"Flight" photograph.

A delightful impression of the prototype Miles Master two-seater advanced trainer (Rolls-Royce Kestrel XXX).



"Flight" photograph.

A group of Airspeed Oxford twin-engined advanced trainers (two Armstrong Siddeley Cheetah X engines).



"Flight" photograph.

A North American Harvard trainer (Pratt and Whitney Wasp) being flown by a Martlesham test pilot.

Avro Tutors (still extremely popular, though some years old) rehearsing for an Empire Air Day "crazy flying" event at Northolt.

"*Flight*" *photograph.*

The D.H. Tiger Moth (top) and the Miles Magister are both *ab initio* types fitted with the D.H. Gipsy Major engine.

of high-speed military aircraft with such refinements as constant-speed airscrew, flaps, and retractable undercarriage.

From America we are obtaining four hundred North American Harvard machines for somewhat similar duties. The Harvard is fitted with a 550 h.p. Pratt and Whitney Wasp and, like the Master, is a two-seater low-wing monoplane.

For training on twin-engined machines the R.A.F. is using the Avro Anson (already referred to in the Coastal Defence Section) and the specially designed Airspeed Oxford. Apart from having a fine performance (top speed 197 m.p.h.) the Oxford is roomy and easily maintained. It can be used for teaching normal flying, navigation, night flying, wireless telegraphy and direction finding, bombing, gunnery and photography.

The Royal Air Force Volunteer Reserve is using, apart from its *ab initio* types, Hinds and even Battles.

The R.A.F. To-day:

MISCELLANEOUS TYPES

THE ROYAL AIR FORCE of to-day needs a variety of machines apart from its bombers, fighters and the other types already surveyed.

Prominent among these are the big bomber transports which can be used for offensive purposes or for the transport of troops, supplies, spare engines and the like. These are mainly employed abroad, though troop-carrying exercises are sometimes conducted in this country with the standard "B.T." machine—the Vickers Valencia biplane with two Bristol Pegasus engines.

As a replacement for the Valencia the Bristol Bombay monoplane, fitted with Pegasus engines of a much later type, is now being introduced. The Bombay is a large high-wing monoplane with very fine lines for a machine of its size, and a fixed undercarriage. Gun turrets are fitted in the nose and tail and aids to an efficient performance include the new Rotol constant-speed airscrews.

For communications and certain types of training the Air Ministry uses the De Havilland Don, a shapely low-wing monoplane fitted with a twelve-cylinder De Havilland Gipsyking (Gipsy Twelve) engine and capable of a top speed of 213 m.p.h. Statesmen and other important personages are often transported in special D.H.86B four-engined biplanes, though these will be superseded before very long by the new Bristol Perseus-engined De Havilland Flamingo monoplanes, which are among the fastest transport machines in the world.

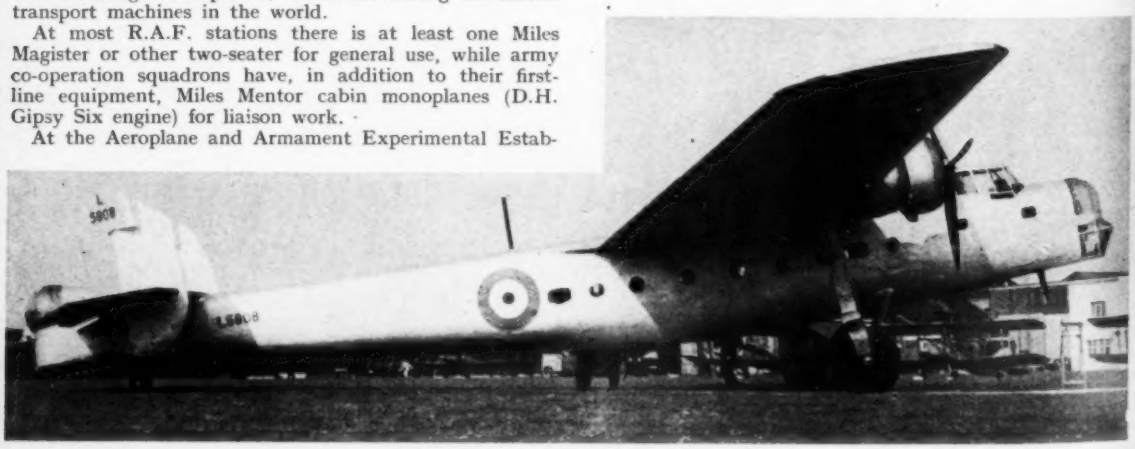
At most R.A.F. stations there is at least one Miles Magister or other two-seater for general use, while army co-operation squadrons have, in addition to their first-line equipment, Miles Mentor cabin monoplanes (D.H. Gipsy Six engine) for liaison work.

At the Aeroplane and Armament Experimental Establishment, Martlesham Heath, and at the Marine Aircraft Experimental Establishment at Felixstowe, there are various types of "hack" machines for experimental work in addition to the latest types which are sent to these stations for official tests.

Practically exclusive to this country is the development of crewless wireless-controlled aircraft to provide practice for anti-aircraft guns. The standard type now in use is the De Havilland Queen Bee, an adaptation of the standard Tiger Moth trainer biplane fitted with the same power plant—the 130 h.p. Gipsy Major. Features include the secret radio control gear, catapulting points (the machine is normally used as a seaplane), slinging gear for hoisting it out of the water and revised cockpit arrangements.

A larger, faster and more powerful type has been developed experimentally by the Airspeed company. This is the Queen Wasp cabin biplane fitted with an Armstrong Siddeley Cheetah engine.

It is customary for the Air Ministry to loan to engine manufacturers suitable military aircraft for trial installations and testing of new engines. The Bristol Company, for example, has used a Hawker dive bomber, a Hart, a Vickers general purpose biplane and a Wellesley. It is possible that we shall see specially developed machines for use as aerial test beds.



Our new standard bomber transport aircraft is the Bristol Bombay, seen above in its production form. The Bombay is fitted with two Bristol Pegasus engines giving over 1,000 h.p. each for take-off and makes use of Rotol constant-speed airscrews.

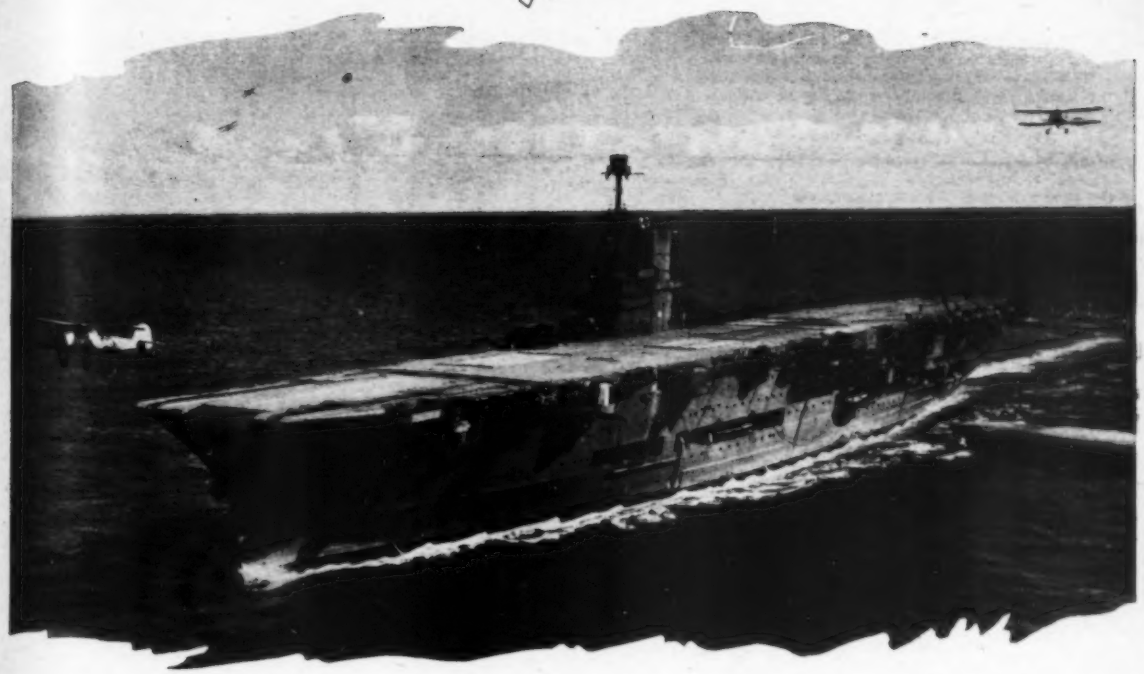
THOROUGHBREDS

The "long-nosed" version of the Bristol Blenheim bomber is being used by certain army co-operation units of the R.A.F. as a long-range strategical reconnaissance machine. In the *Flight* photograph on the right is a flight from a squadron so equipped. Below are Handley Page Hampden bombers, which, like the Blenheims, are outstanding examples of the work of an old-established manufacturer.

SALT-SEA SAILORS

A Fairey Swordfish to... pedo spotter reconnais... sance machine (*Flig...* photograph, left), of t... type used extensive... from the Navy's aircra... carriers, demonstrat... the approach dive tactic... of a torpedo attack. Th... pilot, incidentally, a... P/O. M. L. Gaine, wh... took part in the record-... breaking flight of th... Long-Range Develop... ment Unit.

Below are Hawke... Ospreys operating fro... H.M.S. *Glorious* beneat... a Mediterranean sky th... has temporarily veiled i... proverbial cloudlessne...



A fine impression of our newest aircraft carrier H.M.S. *Ark Royal*. She has a complement of 1,550 officers and men. The machines shown are Swordfish.

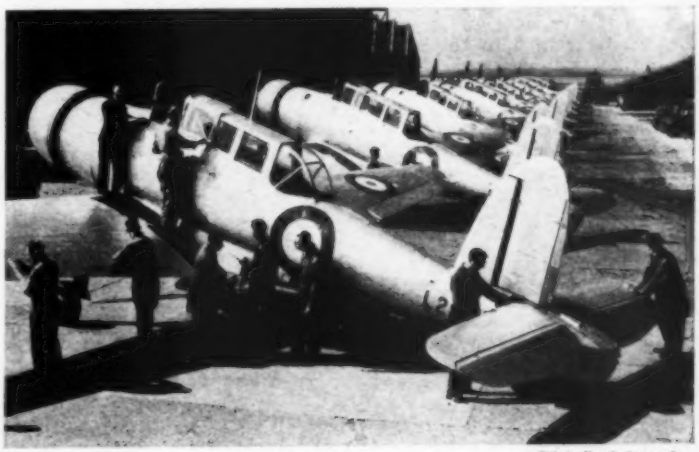
The R.A.F. To-day:

FLEET AIR ARM

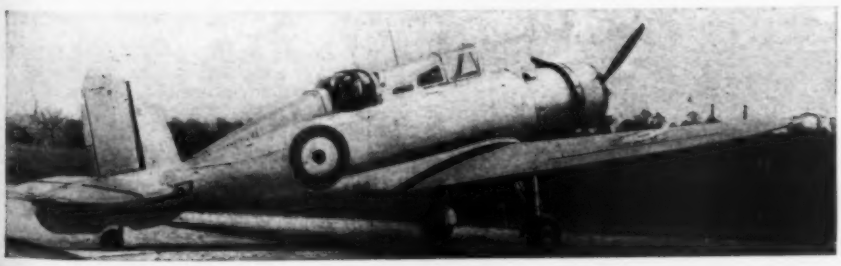
THERE is hardly sufficient space here to describe in very great detail the many ramifications of the great change-over of the Fleet Air Arm from the control of the Air Force to that of the Navy. This is, of course, a gradual process, but the past year has seen wide augmentation of personnel and equipment.

An Admiralty Fleet Order defines the term "Fleet Air Arm" as covering all Naval, Marine and Air Force personnel at Fleet Air Arm shore establishments under naval administration, forming part of a Fleet Air Arm squadron or unit; embarked, for whatever purpose, in naval aircraft; detailed to assist in work involving, or connected with, the handling or maintenance of Fleet aircraft, or other work for which Fleet Air Arm officers may be responsib'e.

Aerodromes at Lee-on-the-Solent, Ford (Sussex), Worthy Down (Winchester), and Donibristle (Fife) have been transferred from the R.A.F. to the Navy, and accommodation in the form of aircraft carriers is being correspondingly increased. At the moment the Navy has the *Courageous* and *Glorious* (22,500 tons, 30½ knots), the new *Ark Royal* (22,000 tons, 30¾ knots), the *Furious* (22,450 tons, 31 knots), the *Eagle* (22,600 tons, 24 knots), and the *Hermes* (10,850 tons, 25 knots). Additionally there is the old *Argus*, which has been fitted out as a "mother ship" for Queen Bee wireless-controlled target aircraft. Carriers under construction are the *Illustrious*, *Victorious*, *Formidable*, *Indomitable* and *Implacable*, all of 23,000 tons. The

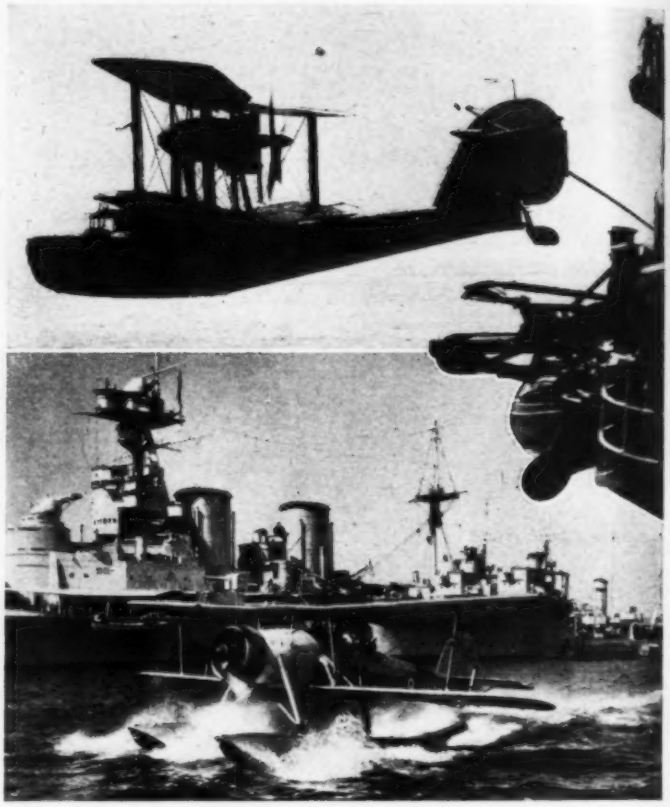


"*Flight*" photograph.



Blackburn Skua dive-bomber-fighter monoplanes at Brough before delivery to a Fleet Air Arm squadron

The Blackburn Roc (left) is a two-seater Fleet fighter, very similar to the Skua, fitted with a multi-gun power-driven turret.



The Supermarine Walrus (top) is an amphibian flying-boat used extensively for catapult work. Below it is a Fairey Swordfish torpedo-spotter-reconnaissance machine operating as a float-plane.

aircraft used from these ships are, for the greater part, biplanes, although very considerable numbers of Blackburn Skua monoplanes are now being delivered.

Smallest of the Naval aircraft in use are the single-seater fleet fighters. For many years our standard type has been the Hawker Nimrod, but certain fleet fighter squadrons are being equipped with Gloster Sea Gladiators. These machines, highly manœuvrable biplanes with Mercury engines, are essentially similar to the Gladiators used by R.A.F. fighter squadrons, but carry in addition to their four guns and other Service equipment a collapsible dinghy, in case of a forced alighting on the sea, and a hook which can be lowered to engage with the arrester wires on the deck of an aircraft carrier.

An obsolescent fleet fighter reconnaissance type is the Hawker Osprey biplane also with a Kestrel engine. The new two-seater Fleet fighter which will shortly be appearing on the carriers and, in all probability, on the catapults of other naval craft, is the Blackburn Roc, built by the Boulton Paul concern at Wolverhampton. The Roc is basically similar to the Blackburn Skua dive-bomber-fighter (of which more later), and carries its armament of machine guns in a power-driven turret after the same fashion as that described earlier in this issue in connection with the Boulton Paul Defiant. Like the Skua, it is fitted with a supercharged Bristol Perseus sleeve-valve engine, and has a watertight monocoque fuselage.

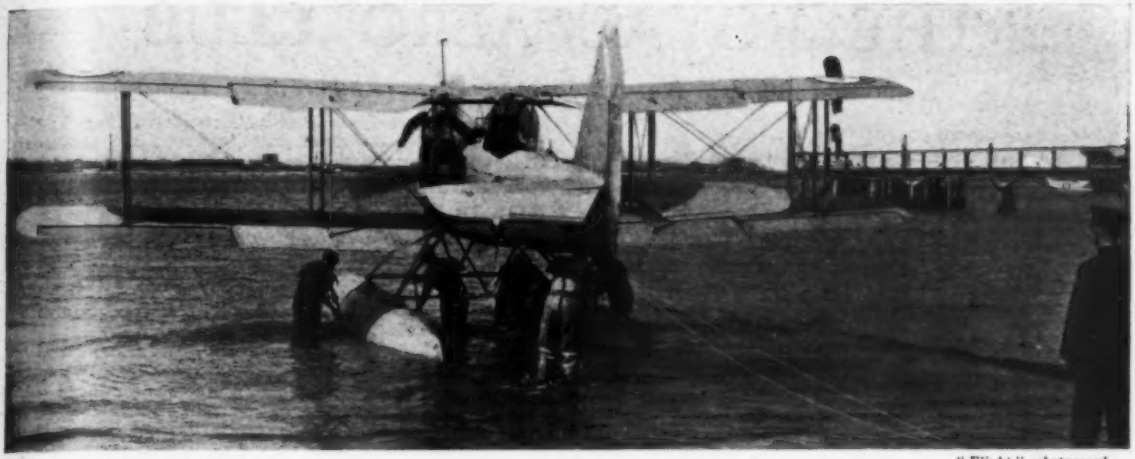
Intended primarily for dive bombing, the Blackburn Skua has a different armament arrangement from the Roc, and has specially designed flaps to retard its speed in a bombing dive, enabling the pilot to approach more closely to his target and to obtain greater accuracy. Ingenious wing folding arrangements are incorporated, and the machine is quite up-to-date in its conception.

For torpedo dropping, gunnery spotting and reconnaissance work the Navy has large numbers of Fairey Swordfish and Blackburn Shark biplanes. These carry a crew of two or three, depending on the duties being undertaken, and in landplane form have a maximum speed in the neigh-

"Flight" photograph.

During training pilots are assisted in their "landings on" by signals from an officer stationed on the deck of the carrier.

On the left the Blackburn Shark is seen just before touching down and engaging its arrester hook with the transverse wires on the deck.



"Flight" photograph.

The Fairey Seafox (above) is a light reconnaissance biplane used mainly from cruisers. It has a 16-cylinder Napier Rapier engine.

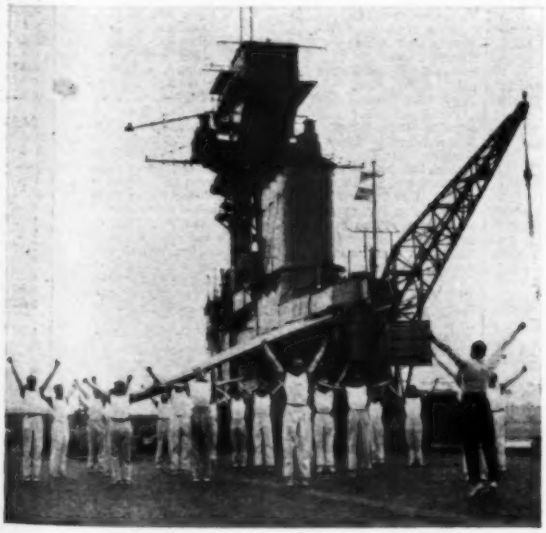
Catapult training is given in the first instance on land. On the right a Fairey Swordfish is seen being "fired."

bourhood of 150 m.p.h. In addition to the 21in. torpedo or the externally carried bombs the machines are armed with two guns, and carry, moreover, wireless, night flying gear, flotation gear (in the case of the Swordfish, at least, the Shark having a watertight fuselage like the Skua) and can be arranged to lay smoke screens for the protection of surface craft. The Swordfish is fitted with a Bristol Pegasus engine, whereas the Shark, which now, incidentally, has a coupé top to improve the comfort of the crew, uses a 24-cylinder Armstrong Siddeley Tiger.

Initial training in deck landing is given in De Havilland Gipsy Moth biplanes. After a few landings with these machines, the pilots under instruction are transferred usually to a Swordfish and are soon proficient at engaging the arrester hook with the deck wires.

Prominent among the machines used for catapulting from warships is the Supermarine Walrus amphibian flying-boat—a biplane of strange appearance but a highly popular and successful type. Its single Bristol Pegasus engine drives a pusher airscrew.

A comparatively recent type is the Fairey Seafox which, fitted with a Napier Rapier engine of under 400 h.p. has a performance sufficiently high for its particular duties. It is extremely sturdy and can be operated in surprisingly rough weather. One gun is carried for defence.



The deck of an aircraft carrier, in this instance H.M.S. *Hermes*, makes an admirable open-air gymnasium.

An Aviation Tragedy

BRITISH aviation circles learned with something of a shock of the death last week of Mrs. G. A. R. Williams, as a result of a fall down the stairs of a London tram. Mrs. Williams was formerly Lady Mary Heath, and when she first took up flying she became famous as Mrs. Elliott-Lynn.

Of Mrs. Williams' private life in recent years *Flight* has no wish to write. That was entirely her own affair. As a pilot she did much to get British aviation, and especially private flying, known abroad. It is as Mrs. Elliott-Lynn at the French light plane meeting at Orly, near Paris, that we like to remember her. She was the only woman pilot in that competition, and as such earned the respect and admiration of all her male competitors.

At Orly she was flying the original Moth, G-EBKT, and we shall always remember an occasion when she had damaged her machine slightly in a landing test and had to fetch spares from the hangar. She *ran* the entire length of the Orly aerodrome, and it was no short distance, in order to get repairs effected before her time limit was up. It is fairly safe to say that none of the male pilots could have equalled that feat of exertion, and her athletic training stood her in good stead.

Mrs. Williams made many notable flights during her career, and it was without a doubt her flying accident at Cleveland, Ohio, about ten years ago, which marked the beginning of the subsequent tragedy of her life. From that accident she never recovered, and it is a sad commentary on our social system that where it should have pitied and helped her it punished her. For her behaviour during the last few years she was obviously not responsible. And now may she rest in peace.

THE ROYAL AERO CLUB

News and Official Notices for the Week Ended May 13

Who's for Deauville?

A PROGRAMME exceeding in variety and entertainment value anything previously conceived is now being planned for the famous Deauville Week-end Air Rally, which is to be held from July 14-16. Applications to take part in this Rally are already coming in to the Royal Aero Club. There is still room for many more pilots and passengers, but it must be pointed out that if inclusion among those taking part is to be ensured application should be made in the near future.

For the Plantagenet Air Rally at Angers, from July 22-25, there is slightly more time to receive applications, but here again it is recommended that applications should be put in at the earliest possible moment. People going to the Deauville Rally will be guests of the Aero Club of Deauville and will be given hotel accommodation, meals and free admission to the casino, golf course and tennis courts. The Plantagenet Rally is a picturesque air meeting to be held in conjunction with the inauguration of the monument to the Plantagenet kings. Dinners, visits to the vineyards and garden parties will be included in the programme. Here again competitors and their passengers will be the guests of the Aero Club De l'Ouest during the week-end.

4 "A's" p.h.

DURING the last two hours of the first Air Defence Cadet camp at Dunstable, new "A" Gliding Certificates were being earned at the rate of one every 15 minutes. Bad weather had held up the training during most of the fortnight but, even so, six Certificates were obtained. A lull in the bad weather occurred on the evening of the last day and immediately all hands turned to to make the best use of the time available. The result was what is believed to be a record speed of instruction, and eight Certificates were gained. Wholly untrustworthy reports were circulated after the close of the camp to the effect that certain of the enthusiastic Cadets had overspent their budgets and had to be taken home in the cars of members of the London Gliding Club.

Radio Diplomacy

THE Private Owners and Air Touring Committee of the Royal Aero Club are now considering proposals relating to a practical international radio service for touring aircraft, and foreign aero clubs are being approached for their views as to the practicability of working on a wavelength of below 10 metres in certain zones.

On the Air Routes

BELGIUM: *Brussels* Aerodrome is now again open to public air traffic by day and night, on completion of repair work.

Attention is again drawn by the Belgian authorities to the *Liége* and *Namur* prohibited areas. Any aircraft that flies over one of these areas is required to land at the nearest aerodrome outside the area flown over.

The prohibited areas are bounded as follows:—

(1) *Liége area*:—

The *Maestricht-Tongress* and *Maestricht-Amay* roads, line joining *Amay* and *Rivage*, the *Rivage-Remouchamps* railway line, line joining *Remouchamps* and *Verviers*, the *Verviers-Aix-la-Chapelle* railway line as far as the German frontier, the German frontier and the Netherlands-Belgian frontier as far as the *Maestricht-Tongress* road.

(2) *Namur area*:—

Andenne-Eghezée-Bovesee-Moustier-Fosse-St. Gérard-Codinne-Spontin-Ohey-Andenne roads.

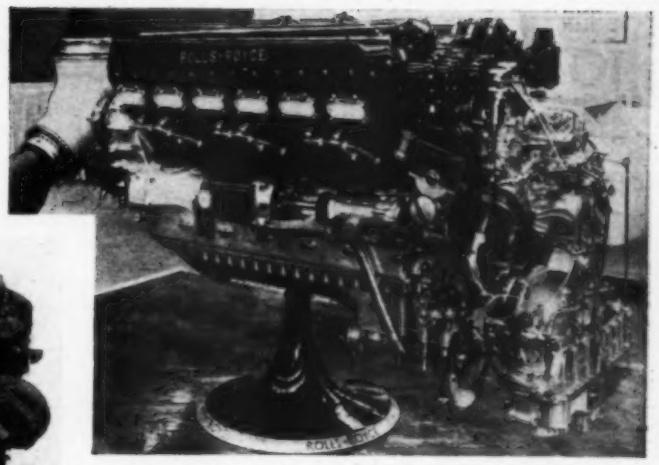
DENMARK: *Aalborg* aerodrome was opened to public air traffic on May 1, also *Esbjerg* public landing ground.

Aviators' Certificates

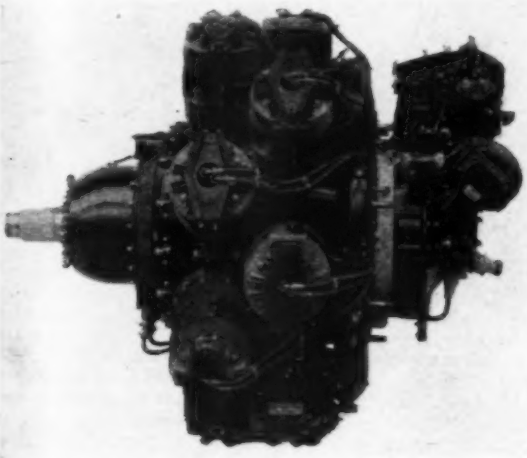
No.	Name	Club or School	Date
17,940	Rowland John Steer	Weston Aero Club	27.4.39
17,941	Richard Dynely Caesar	Weston Aero Club	24.4.39
17,942	David Henry Colt Fry	Weston Aero Club	23.4.39
17,943	Robert Cecil Dudley Boger	Cinque Ports Flying Club	5.5.39
17,944	Richard Malcolm Abraham	Witney and Oxford Ae. C.	28.4.39
17,945	Harold Francis Preston	Bournemouth Flying Club	5.5.39
17,946	Sybil Marion Canning	Bournemouth Flying Club	1.5.39
17,947	Monica Maggs	Bournemouth Flying Club	3.5.39
17,948	Frank Douglas Vernon	County Flying Club	5.5.39
17,949	Robert Irwin Maddin Scott	County Flying Club	4.5.39
17,950	Marjorie Maud Smithson	North Staffs Aero Club	30.4.39
17,951	Arthur Jack Stacey Edwards	Wiltshire Flying Club	3.5.39
17,952	Frederick Neville Davies	Cotswold Aero Club	30.4.39
17,953	Frank Lee Haigh	Doncaster Aero Club	28.4.39
17,954	James Malcolm Ian McIntyre	London Aeroplane Club	30.4.39
17,955	John Alan Cutting Grieves	Malling Aero Club	4.5.39
17,956	Phyllis Dora Streatfeild	Misr Airwork Flying School, Almaza, Egypt.	28.4.39
17,957	Rita Townsend	Thanet Aero Club	5.5.39
17,958	Douglas Frederick Cottrell	Thanet Aero Club	20.4.39
17,959	John Dick Thomson	Southend Flying Club	5.5.39
17,960	Edward Manser Tanfield	Southend Flying Club	6.5.39
17,961	Frederick William James Jones	Southend Flying Club	6.5.39
17,962	Edwin James Sanderson	Southend Flying Club	6.5.39
17,963	Harold Wright	Wiltshire Flying Club	6.5.39
17,964	Francis Joseph Liddle	Border Flying Club	3.5.39
17,965	John Richardson Emmerson	Border Flying Club	3.5.39
17,966	Aubrey Poupard	Thanet Aero Club	7.5.39
17,967	Denis Grahame Hornsey	London Air Park F.C.	4.5.39
17,968	Frederick George Chapman	Southend Flying Club	6.5.39
17,969	Douglas Hugh Keary	Southend Flying Club	23.4.39
17,970	John Fotheringham Parker	Malling Aero Club	29.4.39
17,971	Roger William Burton	De Havilland School of Flying.	8.12.38
17,972	Eric John Watts	Herts and Essex Aero Club	6.5.39
17,973	James Dellow	Herts and Essex Aero Club	6.5.39
17,974	John James Stuart	Autogiro Flying Club	6.5.39
17,975	Oscar René Cramer	Bedford Aero Club	6.5.39
17,976	Graham Ernest Spencer	London Air Park F.C.	5.5.39
17,977	John Frederick Feltwell	Norfolk and Norwich Ae.C.	6.5.39
17,978	John Watson Hancock	Norfolk and Norwich Ae.C.	4.5.39
17,979	William Gill Burgon	Exeter Aero Club	11.4.39
17,980	Cecile Power	Exeter Aero Club	2.4.39
17,981	Arthur Reynolds Bancroft Chambers.	Bedford Aero Club	8.5.39
17,982	Patrick William Lawson	Exeter Aero Club	5.5.39
17,983	Edward Thomas Bradford	Exeter Aero Club	2.4.39
17,984	John Rose	Doncaster Aero Club	8.5.39
17,985	Cyril Llewellyn Rees	Eastbourne Flying Club	3.5.39
17,986	Patrick Theodore Stuart-King	West Suffolk Aero Club	8.5.39
17,987	Nigel William Usmar	Malling Aero Club	4.5.39
17,988	Roydon Wormell	Eastbourne Flying Club	2.5.39
17,989	Alastair Douglas Arnott	Insurance Flying Club	7.5.39
17,990	Norah Harrison	Tollerton Aero Club	5.5.39
17,991	Denis George Cresswell	Tollerton Aero Club	6.5.39
17,992	George Lionel Clack	Tollerton Aero Club	4.5.39
17,993	Colin Lee Pyman	Tollerton Aero Club	3.5.39
17,994	James Alfred Moody	Tollerton Aero Club	2.5.39
17,995	Frank Hearn	Tollerton Aero Club	27.4.39
17,996	Cecil George Dennison Airey	Newcastle-on-Tyne Ae. C.	27.4.39
17,997	Duncan William Chisholm	York and Leeming F.C.	7.5.39
17,998	Walter Scott Campbell	Northern Aviation Club	6.5.39
17,999	George Thomas Dumbrill	Southend Flying Club	9.5.39
18,000	Ernest John Charles Hatchard	Southend Flying Club	8.5.39
18,001	Rodney Edward Maitland	Southend Flying Club	9.5.39
18,002	Sidney Ronald Fox	Leicestershire Aero Club	6.5.39
18,003	Herbert Whitaker	Yorkshire Aeroplane Club	8.5.39
18,004	Ronald Henry Mott	Yorkshire Aeroplane Club	8.5.39
18,005	Mary Elizabeth Oakley	Yorkshire Aeroplane Club	8.5.39
18,006	Margaret Mildred Greatorex	Yorkshire Aeroplane Club	8.5.39
18,007	Charles Harold Spencer	Airwork Flying Club	26.4.39
18,008	Barbara Kathleen Lyall	Romford Flying Club	8.5.39
18,009	George Kenneth Dunn	Romford Flying Club	5.5.39
18,010	Harold Garfit Watts	Lancashire Aero Club	6.5.39
18,011	Percy Ralph Peters	Romford Flying Club	9.5.39
18,012	John Charles Shirley	Midland Aero Club	8.5.39
18,013	Maurice Herbert Cave	Midland Aero Club	4.5.39
18,014	William Frederick Castle	Midland Aero Club	4.5.39
18,015	Arthur Samuel Doley	Midland Aero Club	27.4.39
18,016	Charlie Evans	Midland Aero Club	6.5.39
18,017	Leonard Vincent Sutton Mann	Midland Aero Club	8.5.39
18,018	Edgar Athole Ross	Cinque Ports Flying Club	6.5.39
18,019	Frederick Walter Ollis Street-Porter.	Cambridge Aero Club	3.5.39
18,020	Richard James Jones	Cambridge Aero Club	3.5.39
18,021	Kenneth Percy Glassborow	Cambridge Aero Club	19.4.39
18,022	Andrew Nairn Christie	Cambridge Aero Club	20.4.39
18,023	Robert Charles Brimley	Cambridge Aero Club	28.4.39
18,024	Leonard Henry Elliston	Cambridge Aero Club	28.4.39
18,025	Ursula Mary Preston	Romford Flying Club	10.5.39
18,026	Mary Eirene Davies	London Aeroplane Club	9.5.39
18,027	Strathmere Folkes Beadman	London Aeroplane Club	9.5.39
18,028	Eileen Mary Reynolds	London Aeroplane Club	3.5.39
18,029	Ernest Leonard Leeming	Northern Aviation Club	3.5.39
18,030	Alfred Cole Walker	West Suffolk Aero Club	9.5.39
18,031	William Arthur Smith	Romford Flying Club	8.5.39
18,032	Eric Vizer Fielding Matthews	Airwork Flying Club	7.5.39
18,033	Lady Generis Alma Wyndham Mainwaring.	Airwork Flying Club	8.5.39
18,034	Alexandra Kinloch	Airwork Flying Club	8.5.39
18,035	Charles Miller McClure	London Air Park F.C.	10.5.39
18,036	Alfred James Forth	York and Leeming F.C.	6.5.39
18,037	William Henry Sands	Bedford Aero Club	9.5.39
18,038	James Talbot Edmonds	Malling Aero Club	9.5.39
18,039	Desmond Draffin	Malling Aero Club	9.5.39
18,040	Raymond Archibald Watts	Royal Aircraft Establishment Flying Club.	6.5.39
18,041	John Frangeon Davies	Exeter Aero Club	10.5.39
18,042	Hilda Marianne Heal	Exeter Aero Club	28.4.39
18,043	Alexander Douglas Crone	Portsmouth Aero Club	10.5.39
18,044	Stanley Harold Skiff	Cotswold Aero Club	26.4.39
18,045	Duncan Sutcliffe Brown	Yorkshire Aeroplane Club	9.5.39
18,046	Gwyneth Mary Brook	Yorkshire Aeroplane Club	9.5.39
18,047	Reginald William Witherick	Yorkshire Aeroplane Club	9.5.39
18,048	John Hulme	Northern Aviation Club	7.5.39
18,049	Thomas Edgar Roy Burdett	Northern Aviation Club	3.5.39

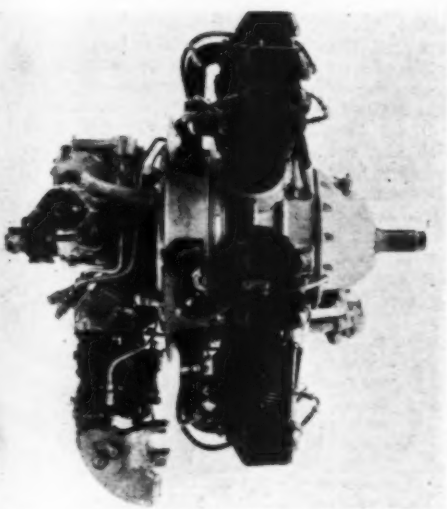
MILITARY POWER

Some of Our More Recent Engines for the Royal Air Force

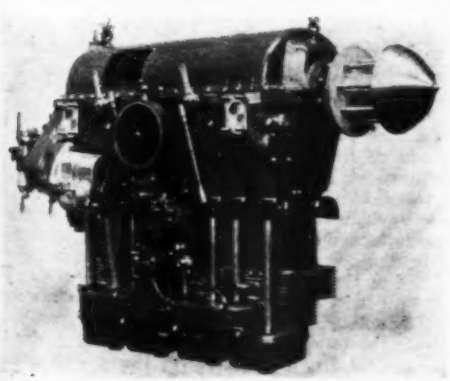


The new Bristol Taurus II fourteen-cylinder sleeve-valve engine (left), although measuring only 46½in. in diameter, gives a maximum output of 1,065 h.p. at 5,000ft. A number of new Service machines will be fitted with Taurus engines. Above is a *Flight* photograph of the liquid-cooled Rolls-Royce Merlin III fitted with a Rotol airscrew hub.

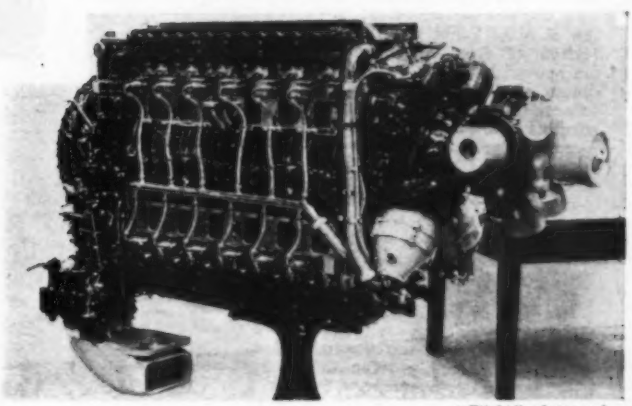




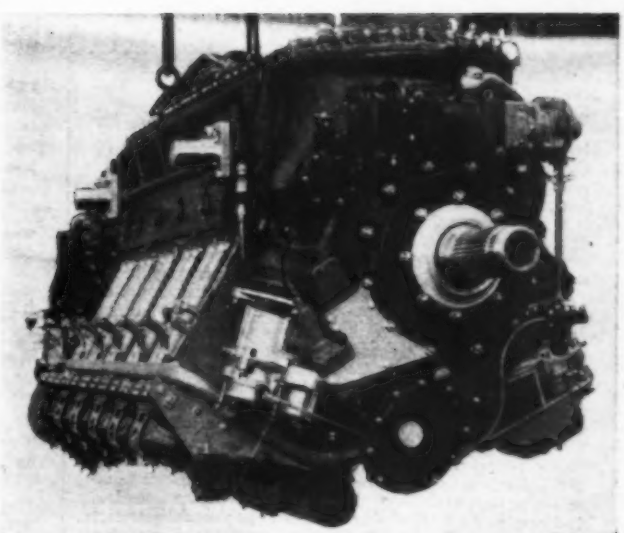
An outstandingly successful engine for general reconnaissance and training duties is the 375 h.p. Armstrong Siddeley Cheetah X, shown above.



The 1,000 h.p. Napier-Halford Dagger VIII (below) is of the type installed in the Hereford bomber.



"*Flight*" photograph.



"*Flight*" photograph

On the left is the Cirrus Major, an engine used in some of the R.A.F. Magister trainers, and above is the D.H. Gipsyking (Gipsy Twelve) as installed in the Don

JOINING THE R.A.F.

The Various Branches of the Service, and How they may be Entered

THE organisation of our Air Force is not very easy to understand, and the man in the street is often justifiably mystified by it. In this special Air Force issue of *Flight* the following brief outline of the organisation will probably be welcomed by many, especially those who wish to offer their services to the country but are uncertain how to set about it.

First of all comes the Royal Air Force, a regular fighting Service. It has two classes of officer, those with permanent commissions, and those with short-service commissions. A permanent commission is obtained (1) by passing through the R.A.F. College at Cranwell, (2) by applying as a candidate from a recognised university, and (3) by promotion from the ranks. A short-service commission is granted to suitable applicants, who undertake (under present arrangements) four or six years active service followed by six or four years on the Reserve—in short, an obligation of ten years in all. Men who want a short-service commission should write to The Secretary, The Air Ministry, Adastral House, London, W.C.2, asking for application forms.

The airmen (a term which includes all non-commissioned ranks) are obtained in three ways, (1) from apprentices who have spent three years at one of the R.A.F. Schools of Technical Training, such as Halton, (2) from boy entrants, and (3) from men who are recruited directly from civil life. Schoolmasters can obtain all information about entry into the technical schools, while those who wish to come in as boy entrants or as men should apply to one of the R.A.F. recruiting offices which are to be found in all large towns. The London office is at Victory House, Kingsway, W.C.2.

Behind the Royal Air Force is the R.A.F. Reserve. Short-service officers who have completed their active service are transferred to this and so are airmen.

The Second Line

Next comes the R.A.F. Volunteer Reserve. This is for direct entry from civil life. There are branches for pilots and observers and also for airmen. The pilots and observers are mostly given the rank of sergeant, but may be commissioned later. Men who have passed through one of the University Air Squadrons are given commissions straight away. There are R.A.F.V.R. centres in most large towns, and the number is being constantly increased. Applications to join should be made to the local Commandant, whose address can be obtained from the *Air Force List*, from any R.A.F. recruiting office, and probably from any post office. The London Centre at present has a waiting list.

The Auxiliary Air Force is quite a different concern. It is on the same footing as the Territorial Army, consisting almost entirely of civilians. To that extent it resembles the Volunteer Reserve, but the great difference between the two is that the Auxiliary Air Force is organised in squadrons of its own, which increase the fighting strength of the Air Force, but do not provide a reserve for the regular squadrons. Most of the air squadrons in the A.A.F. are fighters, which would be used for the defence of the country against bombing raids. In addition, the A.A.F. includes all the balloon barrage squadrons. Applications to join a squadron of the A.A.F., either as an officer or as an airman, should be made to the Commandant of the station or squadron. Any R.A.F. recruiting office, or the Air Ministry Information Bureau (Adastral House, Kingsway—Temple Bar 3553), will give information.

The Royal Air Force (including the Auxiliary Air Force) is organised in Commands, and each Command is divided into Groups where necessary. The Fighter Command is responsible for the air defence of the country, and controls all the fighter squadrons, the anti-aircraft guns and searchlights of the Territorial Army, and the Observer Corps. The latter is a force of civilians whose duty it is to report the approach of enemy raiders.

(*Concluded at foot of opposite page.*)

"Flight" pins to the Drawing-board some Ideas on the Design of Military Aircraft.

THE military aeroplane depicted on this page will never fly—unless undreamed of technical ability exists among the editorial staff of *Flight*. Frankly, the drawing has been prepared because there is no really up-to-date British Service machine (apart from those dealt with in *Flight* during the past year or two) which may be described in detail, or even hinted at.

The *Flight* Hypothesis represents no particular class of military aircraft, but it can carry the equipment necessary for the duties of bombing, fighting, ground attack and reconnaissance, though part of the heavy armament load would, of course, have to be sacrificed were the machine to be used purely as a bomber. In the main, although rather larger, the Hypothesis corresponds with certain French twin-engined general-purpose types now going into Service and, for that matter, with our Bristol Blenheim which also can be used for a variety of duties, including fighting. Actually, our machine is rather larger than a Blenheim and might carry a torpedo in place of its bomb load, though the shell-firing guns shown in the bottom of the fuselage would have to be taken out and perhaps replaced by one or two machine guns.

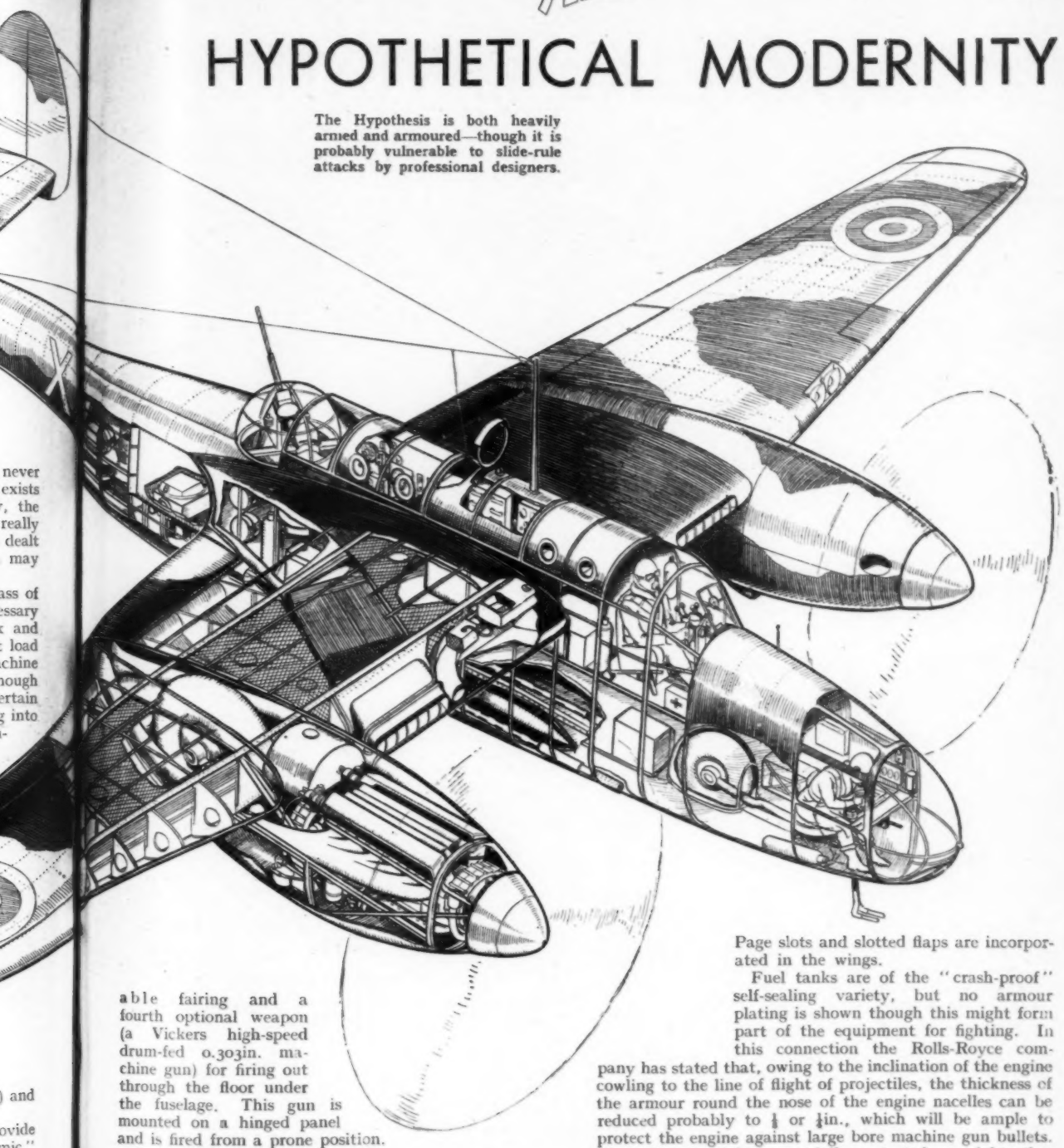
A number of features of design which are now coming into use, or which have been suggested at various times, are incorporated. It will be noted, for example, that the undercarriage is of the tricycle variety, which means simplified landing (particularly at night) and easier taxying.

Vee-twelves of the Rolls-Royce Merlin type provide power, and the radiators—arranged on the "aerodynamic" principle—are placed in ducts in the wing, the cooling air being ejected through slots in the fuselage after a scheme which is the subject of a French patent. There are no external exhaust systems, the pipes being led down to the tail ends of the nacelles where they eject through slots. Exhaust-driven superchargers are not fitted, but the mechanical blowers as shown might be of the two-speed variety which renders high take-off output compatible with performance at altitude. Take-off will be further improved by the use of 100-octane fuel carried in special tanks and fed to the engines for the take-off period. For normal cruising the pilot would switch over to his main supply of "87 octane."

Apart from the two shell-guns which fire out under the nose, there is a third in a power-driven turret with retract-

HYPOTHETICAL MODERNITY

The Hypothesis is both heavily armed and armoured—though it is probably vulnerable to slide-rule attacks by professional designers.



able fairing and a fourth optional weapon (a Vickers high-speed drum-fed 0.303in. machine gun) for firing out through the floor under the fuselage. This gun is mounted on a hinged panel and is fired from a prone position.

The fashionable twin - rudder arrangement has been adopted for the tail and Handley Page slots and slotted flaps are incorporated in the wings.

Fuel tanks are of the "crash-proof" self-sealing variety, but no armour plating is shown though this might form part of the equipment for fighting. In this connection the Rolls-Royce company has stated that, owing to the inclination of the engine cowling to the line of flight of projectiles, the thickness of the armour round the nose of the engine nacelles can be reduced probably to ⅛ or ¼in., which will be ample to protect the engine against large bore machine gun bullets. The radiators might be partially protected, as might other vulnerable parts of the aircraft.

JOINING THE R.A.F.

(*Concluded from opposite page.*)

There is a separate Balloon Command, but in the event of war the balloon squadrons would certainly be placed under the Air Officer Commanding-in-Chief the Fighter Command. The Bomber Command would be responsible for the counter-attack on enemy bases and munition factories, as well as upon his armed forces when necessary. The Coastal Command is in charge of reconnaissance over the waters round the coasts of Great Britain, and would work in close collaboration with the Navy. There are also separate Commands which deal with Training Maintenance of aircraft, and with the Reserve.

Overseas there are Commands in the Mediterranean (entirely for collaboration with the Navy), the Middle East (including Palestine and Trans-Jordan), Iraq, India, Aden and the Far East. In Iraq and Aden the Air Officer Commanding is placed over all the British forces in the country, whether they are Air Force or Army units. In Palestine and Trans-Jordan the Air Force units are under the command of the General Officer Commanding, i.e., an Army officer. In India the R.A.F. is under the general direction of the Commander-in-Chief, another Army officer. In the Far East the R.A.F. is prepared to work closely with the Navy and with the Royal Australian Air Force and Navy.

COMMERCIAL AVIATION

"Flight" photograph.

REFUELLING TESTS: An Armstrong Whitworth A.W.23, acting as the "receiver," taking on fuel from a Handley Page Harrow, used as the "tanker." The hose pipe passes from the forward part of the tanker to the stern of the aircraft to be fuelled. Our photograph was taken from the latter machine.

THE WEEK AT CROYDON

"A. Viator," in His Transport Commentary, Extols the Virtues of a Veteran Airliner, and Complains of the Inexpertness of Experts and the Unfairness of the Cabotage Laws

OLD soldiers never die and old aeroplanes don't even seem to fade away. There are one or two early Fokkers still going strong in different parts of the world, but *Heracles*, I should think, has beaten most records for steady, regular and reliable service. This machine actually has over 1¼ million miles to its credit—mostly on the London-Paris line. Some hundred thousand passengers have been carried since 1931, and the worst accident ever experienced by *Heracles* was when that steward dropped the bottle of Veuve Cliquot. Nor has there been any injury to any passenger or member of *Heracles'* crew—except the above-mentioned steward's mental anguish, which was severe.

A splendid record of one of the best commercial machines, taking things by and large, which was ever designed and built. It is a sad commentary on the aircraft manufacturers of this country that *Heracles* has to keep on flying ten years after his birth—which is much the same as a centenarian having to keep on in the boxing ring—because promise, in certain cases, doth outrun performance.

It often happens in aviation that wiseacres pour scorn on newly-opened airlines, saying they will never pay, and I sometimes chuckle when I remember back to the days when "experts" remarked that there would never be anything worth while in the Amsterdam route—and most others, for that matter, except that between London and Paris, which any mug could see would succeed. One of the most recent of these dolorous prophecies was about the line K.L.M. started some years ago from Liverpool to the Continent, which now calls at Manchester. Of course, it did not do much at first and the North countryman was suspicious and conservative, but now I see that things are looking up considerably, both in passengers and freight.

Quaint business about this 300ft. chimney which was threatened by the Croydon Council and which would be an absolute danger to air traffic in and out of the airport. First the Air Ministry said they could not stop it being built, then I remarked in this column that it was nonsense not to stop so dangerous an erection. For this I was taken to task in lofty tones by Air Ministry Department A. and O. (O.), or Alpha and Omega (Omniscient), which Department seemed to think I ought to know, by telepathic means, that the scheme had been abandoned, for letters about these vital matters are seldom answered.

Now I hear from unimpeachable sources that A. and O. (O.) has got it all mixed up, and that it has not yet been decided whether to continue with the scheme or not. The decision should be simple, for so dangerous a plan has just got to be abandoned, and that's all there is to it.

It was with very genuine regret that a large number of his friends at Croydon heard of the sad death of poor Paddy Flynn, who was as game a sportsman and as likeable a fellow as ever flew.

Air Taxis of Croydon have always been an enterprising firm and I congratulate them on having the services of so trim a pilot as Miss Mona Friedlander. She has her "B" licence, of course, and is, I believe, the only woman to hold a Second Class Navigator's ticket. The company has the utmost confidence in her ability as a taxi pilot and would send her on any job.

For Portly Pilots?

Rumours are rife of a running track and cycle track to be laid down next to the swimming pool opposite the aerodrome. Whether this is for slimming some of our more portly pilots I do not know, but it is already being bruited abroad that the Council concerned is considering purchasing a certain veteran airliner to "pace" the fatter and slower sportsmen.

L.O.T. (Polish Air Lines) now have a Copenhagen to Warsaw line, via Gdynia, which will give excellent connections with London. Leave London, 09.15; arrive Warsaw, 17.00; leave Warsaw, 08.30; arrive London, 16.35. A breakfast to teatime line.

I have been reading in the papers about the quaint system in the coastwise shipping trade whereby Dutch and other ships have collared most of the trade between British ports, although there are (or were) plenty of British ships to do the work. I then looked into the cabotage rules for air transport and found that they had been considerably tightened up lately. Apparently a foreign firm cannot now fly from a foreign to a non-Customs aerodrome with special charter passengers without giving 48 hours' notice and getting Customs and Air Ministry permission—which is a trifle absurd as a flight of this sort might have to be done at a moment's notice on a matter of life or death, and the machine might be

Atlantic Postponement

IT appears that, as forecast in last week's issue, Imperial Airways will not be able to start their experimental Atlantic services on June 1. According to the company's statement, "for various reasons unavoidable delay has occurred in the delivery of the flying-boats allocated to the service. This factor has deprived Imperial Airways of the opportunity of obtaining, during the winter and spring months, the experience which is necessary before the aircraft can be put into service across the Atlantic."

The statement adds that certain modifications, which have been shown to be necessary during the initial trials with the flight refuelling system, are now being incorporated. Further trials will afterwards be necessary before the strengthened "C" class boat can be used in Atlantic service. It is not yet possible to give an approximate starting date.

Merger Details

RATHER earlier than was expected—actually on Friday of last week—Sir Kingsley Wood announced in the House the result of the negotiations which have been proceeding between the Government and the two major airline companies.

Subject, of course, to their approval to Parliament, Imperial Airways' shareholders will be paid 32s. 9d. for each Ordinary share of £1, while British Airways' shareholders will receive approximately 15s. 9d. for each £1 share. If these payments are approved, the sum to be paid out in the case of Imperial Airways will be £2,659,086, while British Airways will be paid £262,500, with a sum of £311,000, which is being repaid to the principal shareholders for advances made.

At the time of the announcement Imperial Airways' shares were quoted at 29s. British Airways' shares, as such, are not quoted on the Stock Exchange, though those for Hillman's Airways of 5s. shares were priced at 2s. The offer to the Imperial Airways' shareholders will be considered by them at a meeting which has been called for next Monday.

Croydon-Dinard

USING a ten-passenger D.H.86B, Wrightways, of Croydon, will be opening a London-Dinard service in June. This will be run during the week-end only, two return services leaving on Saturday and one on Sunday. Wrightways are also, of course, licensed to carry passengers on their early morning freight service to Paris. Machines leave Croydon at about 5.30 and Le Bourget at 8.15 a.m. and 1 p.m.

K.L.M. to Australia ?

THE Australian Government has not yet announced its decision on the admission to the Commonwealth of a Dutch air service in addition to that operated by the K.N.I.L.M. between Batavia and Sydney. In the meantime, however, it has had placed before it a new proposal. This is that K.L.M. should take over one of the two services a week now operated by the K.N.I.L.M.

If accepted this suggestion would mean that K.L.M. would obtain an uninterrupted schedule between London and Sydney once a week—which is at present impossible for Imperial Airways, since the Commonwealth Government maintains sovereignty over the Singapore-Sydney section of the route. Presumably, if K.L.M. are permitted to run a through service, Imperials will ask permission to do so as well.

THE WEEK AT CROYDON

(*Concluded from p. 514*)

ordered for the early morning or late night, when special permission could not be obtained from any Government office.

Anyway, the whole thing, from the 'phone call in Paris or Brussels, for example, to the termination of the flight in England, might take under four hours. What *is* bad is that it has recently been decided by H.M. Customs that a foreign machine *en route* for a non-Customs aerodrome may not clear Customs at Croydon and then fly on to a destination inside this country. If that is done it is said that the foreigner has made an internal flight and Customs claim that the machine has been "imported." They then demand 20 per cent. of the value of the machine as duty.

I say that this hampering of what has always been regarded as fair trade is bad because it will prove a boomerang in due course, when foreign countries do the same thing and British charter companies will suffer.

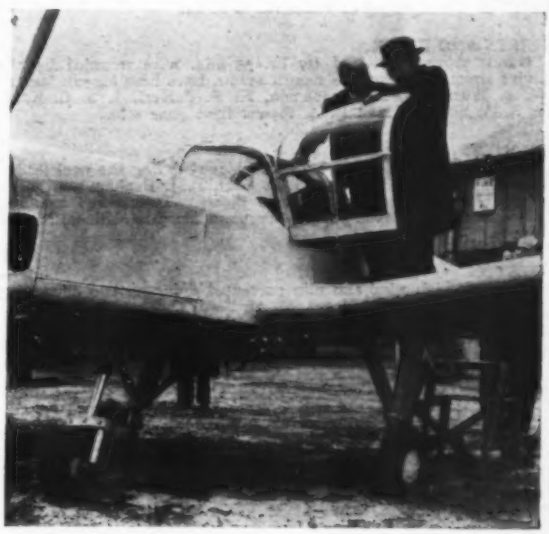
A. VIATOR.

What Does the Operator Want

SOME time ago several firms were invited by the Air Ministry to tender for a thirty-passenger long-range civil type. One of these firms was General Aircraft and, bravely enough, they have now published, in a special issue of the *General Aircraft News*, the details of their design, as well as information about the various considerations which led the technical staff to lay the machine out in a certain way. At the same time another alternative design is detailed, in which the result of various researches may, at a future date, be incorporated.

The whole of this special issue should be extremely interesting to prospective air travellers as well as to airline operators, pilots and engineers. We use the word "bravely" because not only is General Aircraft giving away quite a lot, but they are also leaving themselves open to criticism. The idea of laying bare their plans is a good, even a generous, one and many criticisms which are forthcoming should at least be constructive and helpful to the company. There is far too great a tendency nowadays for firms to put even their civil projections, so to speak, on a private Secret List, whereas the best results can only be obtained by interchange of opinion and of the detailed results of research.

The design actually submitted to the Air Ministry was a four-engined low-wing all-metal machine with a tricycle undercarriage. Its cruising speed would have been 236 m.p.h. at 10,000ft. on 75 per cent. power, and its maximum range, at 160 m.p.h., 2,925 miles. The all-up weight of the long-range type was estimated at 48,000 lb. and the engines would be four Bristol Hercules IVc with constant-speed airscrews. The company's own idea for a type which would meet the more general need of the operator is a two-Hercules engined high-wing monoplane, also with tricycle undercarriage. This is designed to have a cruising speed of 202 m.p.h. at 10,000ft. on 75 per cent. power, or 198 m.p.h. at 12,000ft. on 65 per cent. power. In short-range form it would carry twenty-four passengers, and in long-range form (2,380-mile maximum) seven passengers and their baggage.



THE AIR MINISTER LOOKS IN: Sir Kingsley Wood interested in the "tricycle" Cygnet during his visit last week to the Hanworth works of General Aircraft, Ltd.; Mr. E. C. Gordon England is showing him its features. "If I had to describe this Company, I should say that it was an enterprising Company," said Sir Kingsley. Remembering the Cygnet, the pressure-cabin experiments and the firm's extensive rearmament work, the Air Minister's compliment is deserved.

For Motoring Enthusiasts

THOUSANDS of flying men are enthusiastic motorists and motor cyclists. This week, two of our associated journals will be of outstanding interest to all such enthusiasts. With each copy of *The Motor Cycle* is presented a 48-page, profusely illustrated Touring Guide, a feature being a large number of maps (in two colours) of favourite touring districts of Great Britain. In addition, *The Autocar*, dated May 19, is a Special Whitsun Number, and contains a supplement of particular interest to Austin owners.

FROM the CLUBS and SCHOOLS

LONDON.
THE flying time for last week amounted to 169 hr. Messrs. H. Jones, D. Gatward, T. O'Neil and E. S. Blinkhorn made their first solo flights. Dr. P. Adams and Dr. E. Aslet have joined the Club as new members.

NEWCASTLE.
Club members logged 42 hr. last week. Members of the C.A.G. unit recorded 96½ hr.

REDHILL.
The flying time for the week ending May 13 amounted to 116 hr. Mr. A. C. Morrisson went solo.

IPSWICH.
During the week ended May 8, 74 hr. were recorded by the Club's aircraft. Miss M. Williamson has gone solo.

NORWICH.
Eighty-two hours' flying time was recorded by Club and C.A.G. members. Marshals are still required for Empire Air Day.

EDINBURGH.
Flying during April was only possible on ten days owing to high winds. In spite of this, over 111 hr. were recorded. Messrs. R. S. Dorward and J. S. Cooper went solo.

YAPTON.
The total flying time for the first thirteen days of this month amounted to 84 hr., in spite of high winds which considerably restricted flying activities during last week.

BORDER.
A shortage of aircraft prevented the fullest advantage being taken of the improved weather conditions. Flying times for the first twelve days of the month amounted to 62 hr.

HERTS AND ESSEX.
During April a total of 417 hr. 55 min. were recorded by the Club's aircraft. So far this month 232 hr. have been logged. Messrs. W. A. Wilkins, J. A. Crouchman, H. P. Calvert, J. S. C. Edge, A. R. A. Shepherd and R. A. Mercer have gone solo.

THANET.
An excellent total of 127 hr. was achieved during the week ended May 8. Messrs. R. D. Rose, G. T. Hart, B. J. Denham and W. S. Wintle have made their first solo flights. Twenty-five members of the C.A.G. Unit took part in the recent Margate National Service Parade.

WESTON.
Although high wind and rain prevented flying on two days, over 100 hr. were recorded. Messrs. W. H. Ford, D. F. Gilliam, C. H. G. Coombs, W. C. Wenham, V. F. Griffiths and A. W. Studley went solo. Over forty members of the C.A.G. Unit have volunteered to be trained into an efficient drill squad for official functions.

STRATHTAY.
During the week ended May 7, 29 hr. were recorded, in spite of bad weather conditions which restricted flying activities for three days. During April 170 hr. were recorded—a record for the club since its inception. Mr. J. Robertson has gone solo, while Messrs. J. Laing and W. B. Morrison have joined the club as flying members.

BEDFORD.
Over fifty Club members took part in a National Service Week procession at Bedford. The programme for Empire Air Day will include a flying display and competitions followed by a flannel dance in the evening. Messrs. D. J. Davies, M. Elrington, H. R. B. Hobbs, J. V. Wood and G. L. Knight have gone solo. Three new members have joined the Club.

BROOKLANDS.
Last week club aircraft logged 149 hr. Capt. R. Bush has taken up the duties of secretary to the club once again. Mr. F. Shirley Fox, who for the past few weeks has been carrying on in that capacity, has now been transferred to the instructional staff. No. 11F Sqn. (Brooklands), A.D.C.C., has now attained full strength. There are forty on the waiting list.

SOUTH COAST.
High winds towards the end of last week somewhat curtailed flying instruction. In spite of this 97 hr. were recorded. The Gorringe trophy competition will be held on June 4. This event will take the form of a triangular cross-country handicap. No. 3 bathing chalet at the Shoreham Lido has been rented for the use of members. A "dawn patrol" has been arranged for August 6.

MARSHALLS'.
Last week the total flying time amounted to 149 hr. Messrs. A. W. Norman and A. C. MacPherson have gone solo.

WEST SUFFOLK.
Last week's flying time totalled 20 hr. A lecture on legislation was given by Mr. E. M. Prentice last Thursday evening.

LUTON.
The total flying time for last week amounted to 52 hr. 15 min. The club now has two Tiger Moths and has ordered three British Taylorcraft.

RENFREW.
Members of the C.A.G. section recorded 67 hr. Messrs. R. D. Gray and H. J. Reynolds went solo. On May 9 Lord Provost Doffan inspected the Unit.

FIRST SOLO

SINCE a detailed list of Aviators' Certificates appears in the official notices of the Royal Aero Club, published each week in FLIGHT, it has been decided to omit from this page references to club members who secure "A" licences—which, of course, usually follow the issue of the R.Ae.C. Certificate. Mention of the ab initio *pilot's greatest moment—his first solo flight—will be made as before.*

EXETER.
In spite of two days of unsuitable weather 110 hr. were recorded during the week ended May 8. Messrs. A. F. C. Rogers, A. H. F. Marks, F. H. Warburton and L. J. Field went solo.

HANWORTH.
Members of the C.A.G. section logged 143 hr., while 58 hr. were recorded by Club members. Messrs. W. P. Jefferies, R. E. P. Pearce, W. N. Rayner, C. E. Rugg and G. E. Sharvell have successfully executed their first solos.

PORTSMOUTH.
Over 128 hr. were recorded during the first thirteen days of this month. Of the twenty-six aircraft which "attacked" the Club during the recent "dawn patrol" eight were successful in evading the combined defence by Portsmouth and Yapton.

PLYMOUTH.
Over 96 hr. were flown during the week ended May 8, in spite of rain and poor visibility which made 2½ days unsuitable for flying. Miss V. M. Axford, Messrs. O. B. Oliver and E. P. Hingston have gone solo.

CINQUE PORTS.
During last week 87 hr. were recorded. Messrs. Burton and Massey of the C.A.G. section went solo. One of the club's oldest members, the Marquis of Kildare, visited the club for the purpose of renewing his "A" licence. Last Sunday Mrs. Ann Davis, Mr. Tony Du Port and Mr. J. Howarth attended the R.Ae.S. Garden Party in the club's Leopard Moth, while Mr. Hackney and Mr. Cockburn chartered a Tiger Moth for the same purpose.

Overseas

BENGAL.
During the month of March a total of 113 hr. was recorded. The club's new Tiger Moth arrived at Karachi and was flown to Dum Dum by Mr. S. P. Ray. The club's annual flying gymkhana was attended by over five hundred members and guests. The various competitions were won by Messrs. K. R. Das, D. A. Bruce, L. Mills and H. H. Marshall.

PENANG.
During the month of March over 127 hr. were recorded by the club's aircraft. Members interested in joining the R.A.F. volunteer scheme should apply to the secretaries, Messrs. Evatt and Co. Cross-country pilots are reminded that all machines landing at Kuala Lumpur must taxi to the aerodrome office to undergo a Customs examination.

MADRAS.
Towards the middle of April a Bay cyclone, centred over Ceylon, began to move north-westwards into the heart of Mysore, as a result of which the parched aerodrome received an unexpected but welcome watering. Several members made a number of long-distance cross-country flights. On Good Friday a bombing competition was held. Dr. Dyson and Mr. Italia tied for first place, with Mr. Fernando third.

HYDERABAD.
Over 83 hr. were recorded last month. Mr. E. K. Jassavalla has qualified for his "B" licence—the first member to do so. At a private dance held on April 15, the Dinroze Cup was presented by Major E. W. Slaughter, M.B.E., to Nawab Khaja Asadullah Khan for the second time. The cup is awarded for general flying ability. The presentation of a silver model aeroplane was also made to Mr. A. W. Whitta, the club's chief instructor, whose services have terminated on his departure from India.

SERVICE AVIATION

Royal Air Force and Official Announcements :

Fleet Air Arm News : Military Aviation Abroad

New Naval Flying Branch

RECRUITMENT for yet another branch of the Royal Navy is now open. Intelligent and physically fit young men aged 17½ to 22 are required immediately for entry as naval airmen, and subsequent training in aircraft gunnery and wireless telegraphy for the rating of air gunner. A limited number of air gunners will be selected for further training for qualification as rating pilot or observer. These three rates, states the Admiralty, will be non-substantive specialist rates, held in addition to the substantive rate of naval airman. They correspond to the higher gunnery and torpedo rates held by men of the seaman branch. The air gunner operates his machine's wireless telegraphy installation when reporting the sighting or movements of the enemy fleet, or spotting the fall of shot for his own fleet. He also fires the rear machine guns which in the newer aircraft are mounted in a turret.

Candidates will undergo a written examination in mathematics, electricity and magnetism and general knowledge. Those successful will enter as Naval Airmen 2nd Class for a course of general naval training, followed by technical courses in wireless telegraphy and aircraft gunnery, of approximately 43 weeks in all. They will then be drafted to the Fleet as Acting Air Gunner 3rd Class.

As in other branches of the Navy, naval airmen will be eligible for progressive advancement to Leading, Petty Officer, and Chief Petty Officer rates. Those achieving a normally successful career will be in one of the highest paid branches in the Royal Navy. After some seven years' service, a man could be a Petty Officer Airman holding one of the three non-substantive rates—rating observer, for example—with pay of £3 17s. a week, and the usual substantial additions of badge money, marriage and other allowances, as in the case of all Naval ratings.

Basic rates of pay range from 14s. a week on entry as naval airman 2nd Class, to 56s. a week and upwards as chief petty officer airman. On qualification as air gunner a man receives extra pay of from 17s. 6d. to 21s. a week, according to grade, or of 31s. 6d. a week extra as rating pilot or observer. As in all other branches, free kit is supplied on entry with a regular allowance thereafter for its upkeep, and excellent food, accommodation and medical and dental treatment are provided free.

Engagement is either for special service of seven years on the active list followed by five years in the Royal Fleet Reserve, or for continuous service of 12 years with the opportunity of voluntary re-engagement for a further 10 years to qualify for a substantial life pension on retirement.

The examination for the first batch of entries will be held at Portsmouth, Devonport, Chatham, Rosyth and Manchester on Wednesday, May 31. Application for entry, or for further information, should be made immediately, either personally or by letter, to the nearest R.N. Recruiting Station, the address of which can be obtained from any Post Office.

Reserve Officers—Vacancies

OFFICERS and ex-officers of the Reserve of Air Force Officers of not more than 43 years of age who are fully qualified and physically fit for flying duties and have qualified at the Central Flying School as flying instructors will, provided they are not at present employed in civil air transport, or in civil schools producing pilots or air crews for the Royal Air Force or the Royal Air Force Volunteer Reserve, be considered for whole-time appointments to the Royal Air Force as flying instructors for periods of not less than six months and not more than three years. No officers would be retained beyond the age of 45. Those accepted for employment will receive the rank and emoluments of Flight Lieutenant and a gratuity on completion of their engagements at the rate of £100 for each year of re-employed service provided the service is satisfactory. As an alternative to employment in the Royal Air Force under the foregoing conditions they will, if they so desire, be considered for recommendation for employment as civilian flying instructors in civil schools under conditions to be arranged with the schools.

Officers and ex-officers of the Reserve of Air Force Officers fulfilling the above conditions, except that they have not qualified at the Central Flying School as flying instructors, will be considered for recommendation to civil schools for appointment as civilian flying instructors up to the age of 45; good salaries are offered. Those who have already relinquished their commissions in the Reserve of Air Force Officers will be recommissioned therein. All such officers will have to undergo a reserve instruction course under arrangements made by the civil schools.

Applications should be addressed to the Under Secretary of State, Air Ministry (S.7 (B)), Adastral House, Kingsway, London, W.C.2, and should indicate the type of employment desired.

National Pigeon Service

A NATIONAL Pigeon Service has been established to assist the Defence Services to make full use of the homing pigeon as a means of communication in peace and war. A Committee has been appointed by the Secretary of State for Air, in consultation with the representatives of the various pigeon fanciers' organisations, to manage the National Pigeon Service under the general direction of the Air Ministry. This Committee is composed as follows: Mr. G. Barrett, President of the National Homing Union (Chairman); Mr. T. Brown, President of the International Pigeon Board; Maj. W. H. Osman, Editor of *The Racing Pigeon* and formerly Chief of the Government Pigeon Service under the Admiralty and Air Ministry during the Great War.

The Secretary will be Mr. Selby-Thomas, who is the Secretary of the International Pigeon Board. The Committee may co-opt additional members representing other pigeon organisations.

Membership of the National Pigeon Service is open to fanciers who breed and train homing pigeons and maintain lofts of at least 20 pigeons of quality approved by the Committee.

In the first instance, a register is being prepared of members who will supervise the organisation of pigeon lofts, which will be required to work with the Royal Air Force in peace time. From this register one of the first needs of the Service will be met: the equipment of reconnaissance aircraft with pigeons as an additional safety measure for use when wireless communication breaks down. This will be of special value in the event of an aircraft making a forced descent on the sea.

Pigeons for this special service will be drawn from the lofts of members living in the neighbourhood of certain Royal Air Force stations. A grant of £5 a year will be paid to owners whose pigeons are accepted for the service of the Air Ministry, to cover the use of ten birds at any one time.

Applications are invited for membership of the National Pigeon Service and should be addressed to the Secretary, Mr. Selby-Thomas, at 22, Clarence Street, Gloucester.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—Sgt. Robert Norman Riddell, Sgt. David Peacock and Cpl. Charles Samson lost their lives as the result of a collision in the air which occurred at Bircham Common, Norfolk, on May 9, between two aircraft of No. 220 Squadron. Sgt. Riddell was the pilot and Sgt. Peacock and Cpl. Samson the other members of the crew of one aircraft. The occupants of the other machine were not injured.

Flt. Cadet Bernard Robert Guille and Flt. Cadet Robert Adrian Greey Morgan lost their lives as a result of a collision in the air which occurred at Stubton, Lincolnshire, on May 8, between two aircraft of the R.A.F. College, Cranwell. Flt. Cadets Guille and Morgan were the pilots and sole occupants of their respective aircraft.

Sgt. Gordon Percival Alan Harris, flying solo, lost his life in an accident which occurred at Redhill on May 7, 1939, to an aircraft of No. 15 Elementary and Reserve Training School, Redhill.

Sgt. Stuart Smith, Mr. James Flynn and Miss A. Tasselli lost their lives as the result of a collision in the air which occurred at Smallfield, Surrey, on May 8, between an aircraft of No. 19 Elementary and Reserve Flying Training School, Gatwick, and one from the Redhill Flying Club. Sgt. Smith was the pilot and sole occupant of one aircraft and Mr. Flynn was the pilot and Miss Tasselli a passenger of the civil machine.

With reference to the disappearance of an R.A.F. aircraft off the mouth of the Humber on May 9, the Air Ministry announces, with regret, that as extensive searches have failed to find the aircraft and the occupants it must now be accepted that P/O. Michael Travers Lloyd and A/C. James Flannery lost their lives on that date.

Royal Air Force Gazette

Air Ministry, May 9.

Royal Air Force

General Duties Branch

The following are granted temporary commissions as Flying Officers on being seconded for duty with the Royal Air Force (April 17):—Lt. T. C. Clarke, Royal Tank Corps; Lt. E. M. Goodale, The Northamptonshire Regt.; Lt. R. I. MacKenzie, The Seaforth Highlanders; Lt. A. P. Reed, The Royal Ulster Rifles; Lt. R. J. S. Rust, The Royal Fusiliers; Sec. Lt. E. C. Ford, Royal Tank Corps.

Pilot Officer on probation R. F. Smythe is confirmed in his appointment (January 25).

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—L. L. W Bamber (March 14); P. S. Devine, G. Grant-

Govan, D. M. Harry, M. T. E. Jenkins, J. O'B. Power (April 4); K. J. Heinbuch, S. R. Henderson, E. K. Leveille, H. N. Tamblyn (April 6).

The following Acting Pilot Officers on probation are graded as Pilot Officers on probation (April 4):—J. L. G. Butterworth, W. Shearman D. S. Smith.

Flt. Lt. R. T. Gething is promoted to the rank of Squadron Leader (April 1).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—R. E. Sharp (November 3, 1938); C. H. Mitchell, S. E. F. Curry, A. N. Cole, J. Mercer (April 14); F. Holman (Acting Flight Lieutenant) (April 16); E. H. Jago (Acting Flight Lieutenant), W. B. S. Simpson (seniority January 19) (April 19); M. P. C. Corkery, F. S. D. Burgis, A. A. Case (Acting Flight Lieutenant) (April 19).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—G. S. P. Rooney (March 31); R. V. Jeff, L. C. Withall, P. C. Rolt, A. V. Hunter, K. Petrie (April 12); D. J. Rogers (April 17); R. L. C. Todd (April 23); W. B. Skinner (April 26); J. A. Meade, J. N. G. Carter, E. J. C. Richardson (April 30).

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—G. F. Lerwill, P. A. Gilchrist, J. T. B. Rowland, R. N. Stidolph, E. G. Palmer, P. H. Alington, T. S. R. King, W. W. Campbell, N. L. Smith (March 2); I. A. Mead (March 3); K. C. Doran (March 19); K. V. Garside (March 20); M. E. Reid (March 26); R. I. K. Edwards, D.F.C. (March 27); G. R. Fiedler (April 1); E. H. T. Thwaites, G. Thomas, G. T. Openshaw, D. P. Bamber (April 3); S. W. B. Menaul (April 7); C. H. Bull (April 13); H. D. Jones (April 16).

The following Pilot Officers are granted the acting rank of Flight Lieutenant on the dates stated:—I. F. McCall (March 2); A. B. Lennie (March 20); W. R. Farnes (April 4).

The following Flying Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—R. N. Wardell (February 19); E. G. Palmer (March 12); G. E. Horne (March 20); J. N. Dowland (April 3); L. Maxwell-Muller (April 13); K. Slater (April 16); R. W. Hase, D. Davies (April 17); M. H. Tillard Cooke (April 18).

P/O. A. B. Lennie relinquishes the acting rank of Flight Lieutenant (April 25); the notification in the *Gazette* of April 14 concerning the relinquishment of the acting rank of Flight Lieutenant by F/O. H. Y. Lawrence is cancelled. (Substituted for notification in *Gazette* of May 2); Lt. Cdr. W. G. C. Stokes, R.N., is re-attached to the Royal Air Force as a Squadron Leader with effect from April 27, and with seniority of September 1, 1938; Lt. F. E. C. Judd, R.N., is re-attached to the Royal Air Force as a Flight Lieutenant with effect from April 3, and with seniority of January 1, 1936; Lt. J. Casson, R.N., is re-attached to the Royal Air Force as a Flight Lieutenant with effect from April 20, and with seniority of January 1, 1937.

Equipment Branch

The following are granted short-service commissions as Acting Pilot Officers on probation (May 1):—J. D. Blackford, C. E. Bradley, G. B. Broadway, C. D. Burrill, J. E. Butland, C. S. Campbell, E. C. Carson, G. W. Coker, G. Davis, N. E. de Gruchy, N. J. Fagan, B. P. Furneaux, S. E. Groves, B. P. Harper, G. W. Henderson, G. E. J. Horan, P. O. Hudson, A. S. Jesson, K. W. Lawrence, E. I. Lee, J. McCartney, S. McGinn, K. F. Mackenzie, D. P. Matthews, J. A. C. Maughan, G. G. Milner, H. T. Morgan, H. Quilliam, H. E. Rossiter, A. B. Thomas, J. Trotman, W. J. Waugh.

Group Capt. R. W. Thomas, O.B.E., is granted the acting rank of Air Commodore (unpaid) (May 1).

Medical Branch

J. P. F. Whelan, M.B., B.S., is granted a short-service commission as Flying Officer for three years on the active list with effect from February 28 and with seniority on February 28, 1938.

The following Flight Lieutenants are transferred to the Reserve, Class D (May 4):—G. P. Jones, M.B., B.Ch.; V. D. Jones, M.R.C.S., L.R.C.P.; D. G. Smith, M.B., Ch.B.

Wing Cdr F. P. Schofield, M.B., B.S., M.R.C.S., L.R.C.P., D.M.R.E., is placed on the retired list on account of ill-health (May 9).

Commissioned Engineer Officers

The following Flying Officers on probation are confirmed in their appointments on the dates stated:—M. J. Grennan (April 14); F. C. Freemantle, C. Hartley, C. G. Johnson (April 20).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

F/O. D. C. Burnley is granted a commission in Class C in that rank with effect from May 9 and with seniority of December 9, 1927.

The following are granted commissions in Class CC as Flight Lieutenants on the dates stated:—Lt. A. MacD. Chalmers (March 15); Maj. P. H. H. Bailey, M.C. (I.A. Ret.) (March 21).

Flt. Lt. G. Baker (R.A.F. Ret.) is granted a commission in Class CC as Flying Officer (Honorary Flight Lieutenant) (March 13); Sqn. Ldr. R. S. Barbour is transferred from Class A to Class C (May 1); Flt. Lt. J. H. Barringer is transferred from Class C to Class A (March 14); F/O. R. A. Dimsdale relinquishes his commission on completion of service, and is permitted to retain his rank (March 31); F/O. (A/Flt. Lt.) C. J. Farrell relinquishes his commission in Class C, and is granted the rank of Flight Lieutenant in Class CC (December 27, 1938).

Equipment Branch

Flt. Lt. A. Jukes, M.B.E. (R.A.F. Ret.) is granted a commission in Class CC as Squadron Leader (January 24).

Medical Branch

Sqn. Ldr. W. G. Weston, M.B., relinquishes his commission on account of ill-health (May 3).

Royal Air Force Volunteer Reserve

General Duties Branch

The following Pilot Officers on probation are confirmed in their appointments on the dates stated:—T. K. Walls (May 9, 1938); D. J. Hamilton, A. C. Dingle, E. M. Webb, S. L. Dodwell, J. N. Glass, R. O. M. Graham (July 13, 1938); R. D. Pexton (July 26, 1938); R. de W. K. Winlaw (August 3, 1938); D. F. Walker (January 9); G. T. Swann (January 19).

Acting Pilot Officer on probation R. G. Sollars is confirmed in his appointment (January 5).

Administrative and Special Duties Branch

The following are granted commissions as Pilot Officers on probation with the honorary ranks stated (May 2):—*Honorary Wing Commander.*—J. W. Collinson. *Honorary Squadron Leaders.*—W. G. Gould, M. G. Lloyd-Jones, H. Manley, D. L. Rundle, H. A. Stokes, A. S. Thomas, M.C. *Honorary Flight Lieutenants.*—G. E. Craggs, H. C. Eddowes, M. Griffiths, J. R. Jones, C. N. Lewis, L. E. Newnham, W. R. J. Phillips, T. W. Sheppard, W. C. Vaughan. *Honorary Flying Officers.*—D. O. Bishop, R. Duckett, J. Evans, T. J. Hughes, F. L. Hulbert, L. W. Marshall, J. Molyneux, F. H. Murray, A. J. Paterson, G. Roberts, H. P. Shallard, G. R. Sharp, R. L. Smith, F. J. O. Taylor, R. R. Vincent, V. G. Walker, C. H. Wright.

The following are granted commissions as Pilot Officers on probation (May 2):—G. H. Blair, A. C. S. Buist, M.C., D. E. Court, P. B. Davies, E. Evans, R. K. Fletcher, L. E. Forrester-Paxton, W. C. J. Foster, C. B. Glynn, D.F.C., R. E. Greensmith, R. T. B. Hedges, C. O. Hinks, S. Hooper, H. V. Jellicoe, K. G. Macmillan, R. S. V. Morris, F. G. S. Musson, F. R. Oddy, J. Olorenshaw, J. Salmon, A. W. Sawyer, E. J. Smetham-Jones, J. A. Stanbrook, J. A. Stedman, E. G. Thomas, P. E. Thomas, R. R. Thompson, H. E. Twaits, J. W. Wathes.

Equipment Branch

The following Acting Pilot Officers on probation are confirmed in their appointments on the dates stated:—F. H. Whiteley, E. H. Turner, K. W. Graham, A. Williams, F. Williamson, C. E. Wratten (March 6); J. F. Hinks, T. ap Simon, A. W. Pim, L. N. Saw, D. McArthur, E. Huntley (March 13); J. Heard (March 20); L. J. Ryall, R. V. Whittaker (March 27); T. J. Kimber (March 28); H. L. E. Julyan (April 4); W. L. Rees (April 11).

The following Acting Pilot Officers are employed with the Royal Air Force with effect from the dates stated:—H. S. Wolff (March 23); H. C. Chatterley, R. R. Wisher (April 11); C. R. Clark (April 24).

Medical Branch

The following are granted commissions in the ranks stated (May 9):—Flt. Lt. A. C. Lysaght, M.R.C.S., L.R.C.P., F.R.C.S., F/Os P. E. G. Burnett, M.R.C.S., L.R.C.P., L. O'N. Knox, M.R.C.S., L.R.C.P.

Auxiliary Air Force

General Duties Branch

No 605 (COUNTY OF WARWICK) SQUADRON.—F/O. H. M. Mitchell is promoted to the rank of Flight Lieutenant (January 26).

No. 608 (NORTH RIDING) SQUADRON.—The following Flying Officers are promoted to the rank of Flight Lieutenant (December 27, 1938):—A. N. Wilson, G. W. Garnett.

No. 616 (SOUTH YORKSHIRE) SQUADRON.—K. Holden is granted a commission as Acting Pilot Officer (April 15).

No. 904 (COUNTY OF SURREY) (BALLOON) SQUADRON.—The following are granted commissions as Pilot Officers (March 3):—J. A. Banwell, T. B. Bright.

Flt. Lt. F. Marshall, T.D., relinquishes his commission (January 21).

No. 905 (COUNTY OF SURREY) (BALLOON) SQUADRON.—F. K. R. Coldstream is granted a commission as Pilot Officer (March 28).

No. 912 (COUNTY OF WARWICK) (BALLOON) SQUADRON.—T. E. H. Grove, D.S.C., is granted a commission as Acting Pilot Officer (March 22).

No. 915 (COUNTY OF WARWICK) (BALLOON) SQUADRON.—R. S. Pearce is granted a commission as Acting Pilot Officer (March 24).

No. 917 (COUNTY OF WARWICK) (BALLOON) SQUADRON.—Lt. Col. C. W. Clark, D.S.O., M.C., is granted a commission as Squadron Leader and appointed to the command of the squadron (February 13).

No. 927 (COUNTY OF GLOUCESTER) (BALLOON) SQUADRON.—The following are granted commissions as Acting Pilot Officers on the dates stated:—G. M. Palmer (April 24); R. Broadbent (April 25).

No. 928 (COUNTY OF GLOUCESTER) (BALLOON) SQUADRON.—The following are granted commissions as Acting Pilot Officers on the dates stated:—A. J. Jones (April 11); W. B. Bush (April 12); A. F. B. Ham (April 13); K. G. Marsh (April 14); A. W. H. Tooke (April 15).

No. 934 (COUNTY OF DEVON) (BALLOON) SQUADRON.—Lt. Col. R. Bastard, D.S.O., is appointed Honorary Air Commodore (May 9).

No. 938 (COUNTY OF NORTHUMBERLAND) (BALLOON) SQUADRON.—Capt. and Bt. Maj. J. M. Todd, D.F.C., T.D. (T.A.), is granted a commission as Squadron Leader and appointed to the command of the Squadron (February 21).

Accountant Branch

No. 902 (COUNTY OF LONDON) (BALLOON) SQUADRON.—H. J. Cuff is granted a commission as Pilot Officer (February 15).

EMPIRE AIR DAY

A Guide to Next Saturday's Displays Throughout the Country

A STUDY of the programmes of the sixty-two Royal Air Force and sixteen civil aerodromes to be open to the public next Saturday, May 20—Empire Air Day—impresses the reader with one very important fact. That is the vast number of ultra-modern types such as the Spitfire, Hurricane and Blenheim that must now be in service in squadrons all over the British Isles. Almost every station is featuring displays by these types, and "travelling circuses" does not explain away their large number.

Mock air raids, in which local A.R.P. units will participate, will be a feature of most of the displays. Visiting aircraft, as well as those attached to each particular station, will take part in the demonstrations at the majority of places.

As in the past, the public will be made very much at home and will be allowed to see the workshops, living quarters and other parts of the station buildings. "Joy-rides" in civil aircraft will be available at a number of places.

Admission charges are 1s. for adults and 3d. for children, and motor vehicle parking will be available at charges not exceeding one shilling. A 60-page souvenir programme will cost 6d. The displays will begin at 2 p.m. and most of them will finish at about 7 p.m. Railway companies are offering cheap fares to R.A.F. aerodromes within a thirty-mile radius of any given railway station.

Rehearsals, open to the public, take place this afternoon (Thursday) at Tangmere, Sussex; Debden and Hornchurch, Essex; Cardington, Beds.; and Ternhill, Shropshire.

The Air League of the British Empire is, as usual, the sponsor of Empire Air Day. Main items of the programmes at Service and civil stations are given below:—

SERVICE STATIONS

HOME COUNTIES and S. MIDLAND AREA

MIDDLESEX

Hendon.—Attack on ground target by Hurricanes; flight bomb raid, "alarm" and engagement of Blenheims; forced-landing competition; bomb raid on convoy; R/T. orders by visitors to aircraft; joy-rides proposed.

Northolt.—Squadron line astern air attack; radio aerobatics; Hurricane and Spitfire display; low attack by Battles; Hurricanes v. Wellingtons; attack on aerodrome; air drill to R/T. orders by visitors; gas demonstration.

BERKSHIRE

***Harwell (Didcot).**—Formation flying by six Battles; pilot broadcasting to public; instructor v. pupil in air battle; bombing of set-piece; aerobatics; parachute; fly past; demonstration by Hurricanes; flying boat flies past.

ESSEX

Hornchurch.—Take-off and fly-past by 27 Spitfires; aerobatics; quick get-away and fly-past by Spitfires; height judging; joy-rides proposed; Battles v. Spitfires in air combat.

Debden (Saffron Walden).—Air race; forced-landing competition; air attack and A.R.P. with anti-gas demonstration; joy-rides in civil aircraft; height- and speed-guessing competition; fighters v. bombers air combat.

North Weald (Epping).—Hurricanes attack aerodrome; R/T. air drill; parachute; height and speed judging; gas bombing by Blenheims; joy-rides.

KENT

Biggin Hill (Westerham).—Altitude race; P.T. display by Air Defence Cadets; air raid with A.R.P.; synchronised aerobatics; Hurricanes v. Blenheims.

INTIMATE FORMATION: Westland Lysander Army co-operation monoplanes complete with supply containers rehearsing over Odiham for the Great Day.

Manston (Ramsgate).—Thirty Ansons in air drill; low flying attack by Hurricanes; aerobatics; joy-rides; low bombing; parachute; flying-boat visit.

***Detling (Maidstone).**—Dive and low bombing; civil flying; air drill; aerobatics; Sunderland flies past; instructor and pupil; three Stranraers visit; set-piece; speed event.

Hawkinge (Folkestone).—Handicap race; converging attack; low bombing and A.R.P.; R/T. to aircraft by visitors; air drill; supply dropping; instructor and pupil.

SURREY

Kenley (Whyteleafe).—Twenty-four Battles in fly-past; air drill; refuelling and rearming; supply dropping; attack on six bombers; aerobatics; joy-rides; Air Defence Cadets' Band.

SUSSEX

Tangmere (Chichester).—Twenty-seven aircraft in air drill; quick get-away and attack on bombers; protection of sea trade; flying boat to fly past; air drill; fly-past.

OXFORDSHIRE

***Brize Norton (Carterton).**—Message picking-up; Oxfords v. Furies; low-flying attack on transport; converging and independent bombing; aerobatics; air target gunnery.

Upper Heyford.—Attack by fighters; air drill; parachute; dive bombing; height guessing; supply dropping; set-piece; joy-rides.

BEDFORDSHIRE

Cardington.—"March past" of balloon barrage; raising and lowering of barrage; handling of balloons; displays of barrage equipment; massed band and drills.

Henlow (Biggleswade).—Aerobatics; parachute testing; low attack by Battles; relay race; fighters v. bombers; bombing a convoy; Queen Bee demonstration.

CAMBRIDGESHIRE

Duxford.—Demonstration by Spitfire; forced-landing competition; defence of Cambridge; glider towing; gas display; formation flying; air drill; supply dropping.

HUNTINGDONSHIRE

Wyton.—Air drill; dive-bombing by Battles; set-piece with high bombing by six Battles; defence by six Spitfires and second attack by six bombers; aerobatics; eighteen Battles in air drill.

NORTHAMPTONSHIRE

Wittering (Peterborough).—Aerobatics; Blenheims intercepted by Hurricanes; "shooting gallery" event; dive-bombing on convoy by Battles; air combat.

BUCKINGHAMSHIRE

Halton (Aylesbury).—Parachute; dive bombing; attack on aerodrome; low bombing; aerobatics; massed drums' and pipers' bands; P.T. display by apprentices.

Cranfield (Bletchley).—Low-flying attack on aerodrome; height- and speed-judging competition; low bombing; air battle; "bottle-breaking" by aircraft gun fire; parachute; aerobatics; radio control.

HAMPSHIRE

Calshot (Southampton).—Carrier pigeon training and equipment; repairs and overhauls of marine aircraft; meteorology; compiling weather maps; air battles; air drill by flying boats.

Gosport.—Balloon bursting by aircraft; R/T. orders to aircraft by visitors; catapulting; attack on convoy; bombers v. fighters.

Odiham (Basingstoke).—Twenty-four aircraft in fly-past; message picking-up; massed formation of Battles; low bombing; height judging; aerobatics; set-piece.

***Thorney Island (Emsworth).**—Bombing a car; R/T. demonstration; visit by flying boats; set-piece; formation drill; parachute; fly-past; message picking-up.

* Stations on view for first time.

EAST ANGLIA AND EAST MIDLANDS

NORFOLK

Bircham Newton (King's Lynn).—Converging bombing; aerobatics; 18 Battles in air drill; ramming balloons in mid-air; Hurricanes and Spitfires; Wellingtons in bombing of set-piece.

Marham (King's Lynn).—Flying instruction relayed by loud speaker; parade of convoys; loading Wellingtons; drill by 24 Battles; Spitfire attack on towed target; air combat; Spitfires v. Blenheims.

[Continued overleaf.

SUFFOLK

Felixstowe (Marine Aircraft Experimental Establishment).—Rubber dinghy race; R/T. by public; bombing; air race; air attack; experimental flying-boats' display; handling of flying boats.

Martlesham (Woodbridge) (Aircraft and Armament Experimental Establishment).—High-speed demonstration; flying boats on visit; air combat; "cavalcade of the air"; handicap race; set-piece.

Mildenhall (Bury St. Edmunds).—Height and speed judging; Spitfires in air drill; air race; 12 Battles in air drill; air combat; low flying and bombing attacks.

Stradishall (Newmarket).—Handicap race; height and speed judging; parachute; massed flight by 24 Battles; attack on tanks; A.R.P. display; air combat.

LINCOLNSHIRE

Cranwell (Sleaford).—Bombing; aerial combat; message and supply; air drill; massed bands; P.T. display; cadets' instructional workshops on view.

***Hemswell (Lincoln).**—Air attack; high-speed display by Hurricane fighter; raid on aerodrome; aerobatics; A.R.P. demonstrations; formation flying; squadron air drill.

***Manby (Louth).**—Formation aerobatics; air combat; bombing; attacks on towed target; attack on armoured car; A.R.P. displays.

Waddington.—Flight formation aerobatics; target towing; supply dropping; low bombing of enemy stronghold; P.T. display; air drill; fly-past of new and old types.

NOTTINGHAMSHIRE

Hucknall (Nottingham).—Air drill by Battles; low bombing of convoy by Battles; speed display by Hurricanes; aerobatics; air-raid defence by fighters and A.R.P. squads.

MIDLAND AND NORTHERN AREA

DURHAM

Usworth (Castletown, Sunderland).—Low and dive bombing; winch-launched gliding; message picking-up; high-speed event; air drill; attack on towed target; fly-past; R/T. by visitors; aerobatics; joy-rides.

NORTHUMBERLAND

***Acklington (Morpeth).**—Message picking-up; air battle; air raid and A.R.P.; converging bombing; speed exhibition; aerobatics; joy-rides.

WARWICKSHIRE

Castle Bromwich (Birmingham).—Low-level bombing; aerobatics; fighter attack; dive bombing by three Battles from Austin shadow factory; low attack on aerodrome, with A.A. defence and A.R.P.

SHROPSHIRE

Ternhill (Market Drayton).—Message picking-up; aerobatics; bombing; air raid and defence; attack on towed target; parachute; attack on enemy transport; joy-rides.

YORKSHIRE

Catfoss (Hull).—Bombing of enemy tank; speed demonstration; aerobatics to R/T. orders; parachute display; set-piece; target towing; formation flying; dive bombing; message picking-up.

Church Fenton (Tadcaster).—Air drill to R/T. orders; air race; quick get-away and attack on enemy bombers by Spitfires; demonstration by Lysanders; aerobatics.

Catterick (Richmond).—Handicap landing competition; air combat; "shoot" against moving target, artillery co-operation; set-piece; speed event; joy-rides.

***Dishforth (Thirsk).**—Bombing; aerobatics; target towing; demonstrations by Battles, Wellingtons and Lysanders; fly-past; speed display by Spitfire.

***Leconfield (Beverley).**—Display by Spitfire; air drill; bombing; Civil Air Guard; formation flying; aerobatics; attack on aerodrome; glider demonstration; A.R.P.

***Linton-on-Ouse.**—Lysander co-operation; supply-dropping; Spitfire high-speed demonstration; high-level bombing, with A.R.P. demonstration.

Thornaby.—Air drill by Battles; parachute dropping; R/T. orders by visitors; massed take-off; set-piece; joy-rides.

WEST COUNTRY

DEVONSHIRE

Mount Batten (Plymouth).—Air drill; high bombing over camera obscura; torpedo bombing attack on pinnace; gas attack; launch of flying boat; Link Trainer demonstration; anti-gas display; barrage balloon.

DORSET

***Warmwell (Dorchester).**—Five flying boats in fly-past; low bombing; speed and height judging—free flights as prizes; air drill.

Filton.—Fighter v. bombers; dive bombing; message picking-up; forced landing competition; low-flying attack by Hurricanes; air drill.

GLOUCESTERSHIRE

South Cerney (Cirencester).—Supply-dropping; message picking-up; attack on aerodrome; joy-rides proposed.

WILTSHIRE

Boscombe Down (Amesbury).—Smoke screen; 24 Battles display; ZZ landing; dive-bombing; slow and fast flying by Hurricanes; aerobatics; message picking-up; fly-past.

Netheravon (Salisbury).—Air drill; 24 Battles in wing formation flying; target towing and attack; supply-dropping; message picking-up; fly-past by Spitfires; bombing.

WALES

CAERNARVONSHIRE

Penrhos (Pwllheli).—Aerobatics; converging bombing; gas attack with Furies, anti-aircraft guns and A.R.P. defenders; air drill; synchronised aerobatics; fly-past.

PEMBROKESHIRE

Pembroke Dock.—Raids, with A.R.P.; mass formation by flying boats; speed aerobatics by Hurricane; R/T. to flying boat by visitors; air combat; parachute.

NORTHERN IRELAND

CO. ANTRIM

Aldergrove.—Air drill; balloon bursting; set-piece; demonstrations by Gauntlet and Spitfire; supply dropping; fly-past; R/T. to aircraft.

SCOTLAND

RENFREWSHIRE

Abbotsinch (Paisley).—Synchronised aerobatics; height-judging; low bombing; instructor and pupil; "battle" take-off; fly-past; air drill; set-piece; air battle.

ROSS-SHIRE

Eventon.—High and dive bombing; R/T. to aircraft; aerobatics; message picking-up; air drill; air raid, bombing of set-piece; fly-past; attack on towed target.

FIFESHIRE

Leuchars.—R/T. orders to aircraft by visitors; air attack; low bombing; "shooting gallery" air gunnery; set-piece; target towing; formation flying; aerobatics; air combat.

ANGUS

Montrose.—Message picking-up; height-judging; aerobatics to R/T. control; "shooting gallery"—anonymous pilot to give display; "first solo" flight; attack on oil refinery.

MIDLOTHIAN

Turnhouse (Edinburgh).—Demonstration flight over city; R/T. air drill; aerobatics; bombing and A.R.P.; mock raid; set-piece; formation flying; target towing; fly-past; supply display.

WIGTOWNSHIRE

West Freugh (Stranraer).—Speed-judging and height-judging competitions with joy-rides as prizes; aerobatics; R/T. orders by visitors; destruction of enemy camp; A.R.F. display.

* These stations are on view for the first time.

CIVIL AERODROMES

LONDON

London Air Park (Hanworth), Feltham.—R.A.F. Flying Training School; formation by 24 Battles, synchronised aerobatics; car bombing; picking up of supplies; fly-past by Hurricane.

BERKSHIRE

Reading (Woodley).—R.A.F. Flying Training School; low bombing; formation flying; aerobatics; fly-past by nine Hurricanes; flight aerobatics; air drill; fly-past of new R.A.F. types, including Magister, Lysander, Blenheim and Hurricane; flying instruction; joy-rides.

BEDFORDSHIRE

Luton.—R.A.F. Flying Training School; civil and R.A.F. flying display; ground exhibits; joy-rides proposed.

NORFOLK

Norwich.—Display by woman aerobatic pilot; "dog fight" aerobatics; formation by Battles; glider towing; Spitfire display; dive bombing by Battles; fly-past by new types, including Harrow, Anson, Wellington and Blenheim; joy-rides; ground display of R.A.F. equipment.

SUSSEX

Shoreham.—R.A.F. Flying Training School; Civil and R.A.F. flying events; ground exhibition; joy-rides proposed.

HAMPSHIRE

Hamble.—R.A.F. Flying Training School; inverted flying; synchronised aerobatics; converging bombing; air race; formation flying; air battle between Hurricanes and Ansons; fly-past.

GLOUCESTERSHIRE

Bristol (Whitchurch).—R.A.F. Flying Training School; aerobatics; air battles; Hurricanes v. Battles; passenger flights; dive bombing attacks; exhibition of new Service types; ground display; visit of flying boat probable.

LANCASHIRE

Manchester (Ringway).—Display by visiting R.A.F. aircraft and civil events, including joy-rides and show of ground exhibits.

Blackpool.—Formation by Whitleys; demonstration of Battle, Spitfire, Lysander and Henley; display by searchlight battery; aerial balloon bursting; display by Blackpool C.A.G.; aerobatics; A.R.P., etc.

LEICESTERSHIRE

Ratcliffe.—Open by courtesy of Sir W. Lindsay Everard, M.P.; finest private aerodrome in the country.

STAFFORDSHIRE

Stoke-on-Trent (Meir).—R.A.F. Flying Training School; display by fighter squadron; exhibition of new Hampden, Hurricane, Battle, Anson, etc.; anti-aircraft and R.A.F. display; ground display.

WARWICKSHIRE

Ansty (Coventry).—R.A.F. Flying Training School; blind flying; attack by Hurricanes; aerobatics; dive bombing; flying instruction demonstration; air race; forced landing; converging bombing; fly-past of types including Blenheim, Battle and Anson; ground display by R.A.F. Flying Training School.

YORKSHIRE

Yeadon.—Auxiliary Air Force Squadron; formation flying; air drill; Spitfire demonstration of flying instruction; bombing by Whitleys; aerobatics; fly-past by Battles.

Doncaster.—Arrival of visiting aircraft; display by Hampdens; march past by A.A., Air Cadets, A.F.S. and C.A.G. units; aerobatics; display by Hurricanes; flying lesson broadcast; fly-past; civil display; joy-rides.

GLAMORGAN

Cardiff.—Auxiliary Air Force Squadron; civil and R.A.F. flying display; ground exhibits; joy-rides proposed.

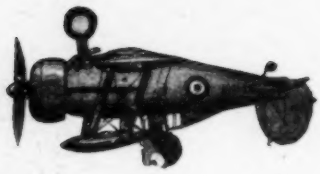
ABERDEEN

Dyce.—Auxiliary Air Force Squadron; squadron formation air drill; aerobatics; height judging; air battle; Hectors and Ansons; speed judging; dive bombing attack and air raid; fly-past.

THE NEW MASTER: In its production form, the Miles Master two-seater advanced trainer (Rolls-Royce Kestrel XXX) has a re-arranged radiator and certain other minor improvements.

Photo by "Flight"

"Westland Lysander Army Co-operation Aircraft as supplied to the Royal Air Force"



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THE R.Ae.S. GARDEN PARTY

Fine Flying and New Aeroplanes Win Appreciation from a Gamp-and-Galoshes Gallery

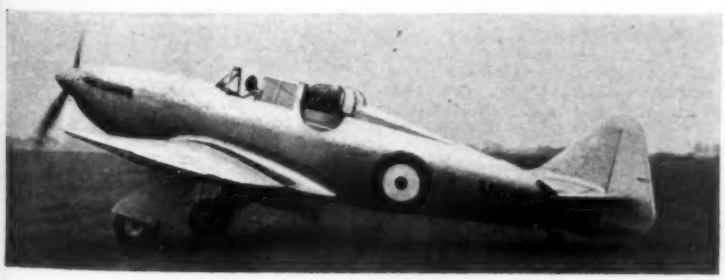
(Illustrated with "Flight" Photographs)

THE Royal Aeronautical Society, like a small boy with an uncomfortable realisation that his innocently ignited squib is well on the way to causing a major conflagration, is getting worried about the success of its annual garden party.

Not that there are any doubts about the success; the trouble is that there is far too much. Year by year—this was the fifth party of the series—constructors have become so enthusiastic that they have put forward their newest and finest aircraft for demonstration by their most expert pilots; the Air Ministry has given its wholehearted support; and everybody who is anybody in aviation, along with a good many thousand who are not, has naturally clamoured for admission.

Tickets are still "obtainable only through members of the R.Ae.S." But that did not affect the fact that, for last Sunday's party, some 6,500 tickets were sold; and applications indicated that the figure would very quickly have reached 10,000 had not Capt. Laurence Pritchard and his henchmen firmly stemmed the tide.

Fairey's aerodrome during one of the less moist intervals. (Below) Two contrasting types, both in appearance and age—the Boulton Paul Defiant and the Fairey Firefly, flown respectively by Flt. Lt. C. Feather and Flt. Lt. C. S. Staniland



So next year, it seems, an effort will be made to restrict the party to its original conception—as a semi-informal but intimate gathering where R.Ae.S. members and their friends may meet, toy with a teaspoon and perchance appraise some device for the advancement of aeronautical science.

The alternative would be to make the party a free-for-all—or, at any rate, a one-and-threepence for all, with public enclosures to accommodate the thousands who would undoubtedly flock there. But that raises all sorts of problems—approach roads, public liability, insurance, entertainments tax, Sunday amusements and all the rest—not to mention the thought of Mr. C. R. Fairey's truly magnificent aerodrome forming the bed

Personalities in the rain: the Air Minister, Sir Kingsley Wood; Mr. C. P. Robertson, Air Ministry Press chief; and Capt. F. T. Courtney.

Mr. and Mrs. C. R. Fairey and Mr. Wallace Barr of Cellon. Mr. Fairey, as usual, had put his fine aerodrome at the disposal of the R.Ae.S.

of a sea of orange peel and stop-me-and-buy-three wrappers.

Last Sunday the Clerk of the Weather tried to solve the problem by putting on the most shocking weather exhibition we have seen for a long time. But he only partly succeeded. The flying programme (under the control of Flt. Lt. Staniland) went perfectly to schedule—only one demonstration machine failed to appear—and fifty-odd private-owner or club aeroplanes were present, though admittedly many of them had arrived during a disarmingly fine morning.

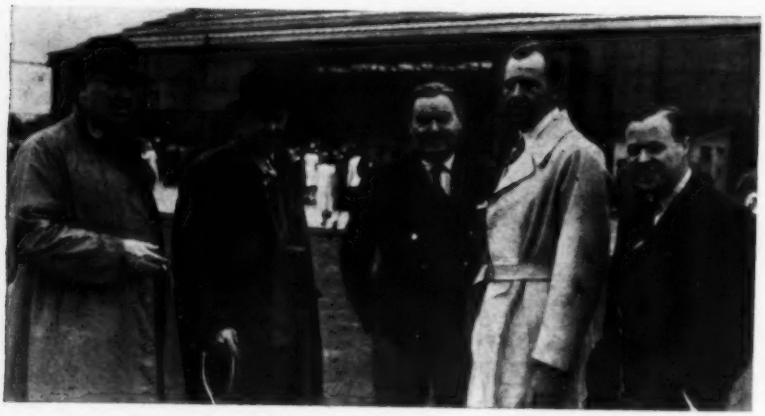
The spectators either crowded the "static" show hangar, sheltered under wings (the Wellington proving popular, and the sharply tapering Albatross less so), or remained battened-down in their cars, a process which involved switching-on screen-wipers or opening sun (*sic*) roofs if aerobatics were to be watched.

Sir Kingsley Wood, the Air Minister, defied the elements, and Capt. Harold Balfour, Under-Secretary, was present also. Mr. A. H. R. Fedden, president of the R.Ae.S., officially received these and many other distinguished guests.

On the whole, the civil performers in the flying display were fairly representative, though those spectators who took the trouble to go and look would have found some newer and more interesting types in the machine park. It is always unfortunate that military machines with more or less unlimited power, flown by experts in the art of demonstration, should somewhat overshadow the quieter and more sedate exhibitions by civil types.

Nobody could say, however, that the first civil machine to be demonstrated did not, by virtue of its small size, prove as impressive as any of the war chariots. This was the white Mew Gull, which was flung about the sky by Capt. E. W. Percival, while a blue Q.6, in the hands of Mr. D. M. Bay, cruised leisurely around—using the word "leisurely" in a comparative sense. Capt. Percival opened with a continuous high-speed steep turn round the aerodrome boundary and then proceeded to pull a couple of exaggerated stall turns from the top of vertical climbs, these stalled turns almost entering the realm of half-rolls. Perhaps the most useful, though probably unnoticed, demonstration was that in which he changed over from one vertical bank to another. Sheer diminutive size gave the dives and climbs a most spectacular appearance. Just for once, after hundreds of perfect touch-downs, Capt. Percival held the Mew off a shade too high on his landing, and when the left wing dropped suddenly it was an anxious split second.

By this time Mr. Hollis Williams should know all about tricycle technique, and he certainly showed the G.A. Cygnet to perfect advantage both on the ground and in the air. Lightly loaded, his "cork from a bottle" take-off showed that the machine had no queer stalling characteristics, and if the ground had not been wet and slippery his high-speed cross-wind, down-wind and up-wind taxying might have been even more impressive. He made two stalled approaches, the second one being particularly Autogyroptic, and one high-speed landing, using, with bursts of motor, most of the aerodrome. Whatever he did, the Cygnet sat firmly on the ground after touching—and that is what a tricycle is for. During his final approach, carried out very slowly indeed, it was not until the machine was within ten feet of the ground that one realised the quite high rate of vertical descent. Without a burst of engine the long travel undercarriage *might* have taken it. Altogether, a magnificent proof of the value of the tricycle.



Mr. "Steve" Melstrom of Shell; Capt. Duncan Davis; Flt. Lt. J. Summers (Vickers test pilot); Mr. Geoffrey de Havilland, Jun. (D.H. test pilot); and Flt. Lt. Maurice Summers (Gloster test pilot).

Jumping to It

Except for the jump start—which caused, by its very suddenness, a certain amount of laughter—Mr. R. A. C. Brie used his familiar technique in the demonstration of the new C.40 Autogiro. He showed its manœuvrability, flew very slowly while weather-cocking the machine into wind, and made two dead-stop landings, a normal C.30 take-off, and one more jump start. The time taken to run up the rotor to the required jumping speed was surprisingly short, and on his last landing Mr. Brie pretty well dropped down into his appointed parking place, so that he only needed to taxy a few yards.

Although it was obvious that Stephen Appleby enjoyed every minute of his eight with the now ancient Scheldemusch, it was not quite clear why this machine should have been given the honour and glory of a sky-show, while other more recent types remained on the ground. Admittedly the Musch is an amusing device, but most of its capabilities rest with the tricycle, and the others with a vast amount of slotted wing area. But this three-year-old machine did at least show what can be done by a designer who has gone all out for safety and low-speed controllability.

While the Musch was crackling round the sky at low altitude, Capt. A. M. Kingwill took the prototype Willoughby Delta round at a reasonable height just to show everybody how much lift can be

Noses—ancient and modern : The Sopwith Pup (circa 1916) and the Fairey P.4/34, now seen with a Rotol airscrew. Admiring the Pup is one who knew the breed well—Sqn. Ldr. "Taffy" Jones of Reid and Sigrist.

obtained from the rest of the structure as well as from the somewhat diminutive wing. At one moment Capt. Kingwill was flying on one engine, but this fact was probably not noticed.

Almost immediately afterwards there was an unmentioned turn by a departing Bücker Jungmann—apparently one belonging to the Hungarian Aero Club party visiting London. The pilot held the machine down during and after the take-off, pulled up in a vertical climbing turn, and rolled right over on to his back. He kept the machine in this uncomfortable position (at first at an extremely low altitude) for half an aerodrome circuit before rolling right way up again. Another unrehearsed and shattering incident was that caused by the fact that the Willoughby Delta took off on its way home while the impressing little rebuilt Sopwith Pup was taking off more or less down-wind in the other direction. The paths of the two did not *quite* coincide.

The three two-seater Tipsys, silver, red and blue—the first with the new "letter box" slots in the wing tips—duly showed that this excellent little machine is now in full production and that it has an aerobatic C of A. While Messrs. Brian Allen and A. D. Ward flew two of them round the aerodrome at low altitude, Flt. Lt. Michael Collins climbed the third one up to the cloud base and showed off its aerobatic capabilities. Unfortunately, this cloud base was down to probably less than 1,000 ft. in places, but it was just high enough to permit straightforward slow rolls and single loops—rolling off the top or otherwise. Since the appearance of the prototype, the Tipsy has been given slightly more rudder area and Flt. Lt. Collins seemed to have no difficulty in keeping his rolls reasonably straight, though it must have been very difficult to do so with a negligible horizon. Apparently the fixed slots, which have just been incorporated in the machine flown by Mr. Brian Allen, permit full aileron control even when the stick is held right back; so that any tendency of the older Tipsy to drop a wing when violently stalled has been done away with.

On the Ground

Of civil machines in the park there was an ample variety. Apart from the British Airways' Fourteen, the K.L.M. D.C.3, the Air France Bloch 220 and the Imperial Airways D.H.91 Falcon, there were at least a dozen civil types of exceptional interest.

For instance, the General Aircraft experimental machine for pressure cabin work was flown over from Hanworth, whence also arrived the latest Arpin pusher with the Cirrus Minor engine, replacing the erstwhile Salmson. There was the little Chilton monoplane, the new Moth Minor, the Luton Major, the Taylor Watkinson Ding Bat, and the new British Taylorcraft with ingenious wheel-cum-stick control. Unfortunately neither the Train-engined Chilton nor the D.H. Flamingo—to quote two extremes in size—was ready in time.

Again this year Mr. R. O. Shuttleworth (of the Warden Aviation Co.) and Mr. R. G. J. Nash (whose concern at Brooklands bears the resounding title of "The International Horseless Carriage Corporation") contributed their veteran machines. Mr. Nash showed the original Bleriot XI three-cylinder "fan type" Anzani) which M. Leon Molin flew at the 1909 Doncaster meeting. Mr. Shuttleworth had three machines out, all of which flew: a Bleriot XIV (fan-type Anzani) and a Deperdussin ("Y" Anzani), on both of which Flt. Lt. Edmunds and Mr. Shuttleworth did circuits; and a Sopwith Pup, which Sqn. Ldr. Wheeler had flown over from Biggleswade, whence he returned in the rain and mist later in the afternoon. (One likes to picture the amazement of some ex-war pilot, motoring up the Great North Road, at seeing such a well-remembered silhouette scuttling through the drizzle overhead.)

Shuttleworth, taking-off across-wind in the Deperdussin, had one cylinder cut out. It resulted in a gentle and innocuous sink to the ground, leading a

Mr. Hollis Williams' exposition of the tricycle Cygnet's possibilities was one of the high spots of the afternoon. Another exhibit which aroused interest was the thoroughly unconventional Willoughby Delta (right).

private owner of our acquaintance to remark that aeroplanes in those days were "much safer."

Incidentally, Shuttleworth has recently acquired — for £15 — a three-cylinder Anzani engine—*unused and still in its original maker's crate!*

It was a field-day for multi-engined military machines. George Lowdell soon had the new Reid and Sigrist twin-engined trainer up to aerobatic height and took advantage of its obviously high performance and of its powers of rapid manœvre, which result from its exceptional compactness.

This chubby little monoplane is the first of its breed to be seen over here, though there were two Continental types in more or less the same class at the last Paris Salon. Aerobatics have virtually been ruled out of modern military flying, but certain types of fairly large twin-engined machines may still be required to do dive bombing, so the agility and solidity of the little Reid and Sigrist as demonstrated on Sunday are still desirable qualities in a Service trainer.

In our opinion the country has never seen finer demonstrations of the handling of modern twin-engined fighter-bomber monoplanes than that by F/O. A. J. Pegg on a "long-nosed" Bristol Blenheim (Mark IV) and by the six Blenheim fighters of No 601 Squadron of the Auxiliary Air Force. After formating to excellent if rather unspectacular effect during the tea interval, this well-drilled half-dozen suddenly and unexpectedly peeled-off from echelon, came screaming right down in true "hell-dive" style over the aerodrome and streaked homewards, leaving everyone just a little shaken and deaf. As the pilots could not use their flaps to limit the diving speed the Bristols must have been doing quite a bit over 300 m.p.h. when they pulled out.

Twin-engined Aerobatics

Pegg took his Mark IV machine round in turns which must have been very "G-making." He looped and rolled it with apparent indifference and generally showed that there is quite a lot of fun to be had out of these modern multi-motored monoplanes, despite the lamentations of the pundits.

Incidentally, this machine was placarded as being fitted with Mercury XV engines and not the normal Mercury VIIIs. One gathered that the XVs differ only in reduction gear ratio from the standard unit, and are, in effect, Mercury VIIs.

Everyone knew, of course, what to expect of the Summers-Vickers Wellington combination. They were not disappointed. Flt. Lt. J. Summers never actually rolled or looped this substantial piece of geodesy, but at times he seemed to be in two minds about it. His tight turns must have occasioned no little tail-trim manipulation.

But the "twins" did not have everything their own way; there was some strong competition from a variety of single-engined machines, each with some exceptional characteristic.

Flt. Lt. Bailey, in the Skua, was weather-bound at Brough and did not arrive to demonstrate, as it was hoped he would, the braking action of flaps when used in the dive, nor the useful all-round performance of this cleverly designed machine.

Flt. Lt. C. Feather performed on the Boulton Paul Defiant two-seater fighter monoplane (R.R. Merlin), which carries a nest of machine guns in its power-driven Boulton Paul turret. This deadly piece of armament inevitably detracts somewhat from the Defiant's elegant form, but the nose is quite the most beautiful we have seen.

The Defiant's take-off seemed on the lengthy side, but Flt. Lt. Feather may have been holding the machine down deliberately.

A slightly modified version of the 283-m.p.h. Fairey P.4/34 bomber was shown off in able fashion by F/O. F. H. Dixon. This latest demonstration of its aerobatic capabilities was of particular interest, because the Danish Government has ordered a fighter version carrying at least eight machine guns. The machine was listed as being fitted with a Rolls-Royce Merlin R.M. 2M. engine, though actually we believe it was an R.M. 2S.M.—a two-speed supercharged unit which gives 1,145 h.p. at 16,750ft. when operating on 100-octane fuel and a correspondingly high take-off output. One could not ascertain whether F/O. Dixon was using 100-octane fuel, but his take-off was certainly exceptionally short. A contributory factor was the three-bladed constant-speed Rotol airscrew.

The Westland Lysander Army co-operation machine is always a rest-cure after the cantilever-winged projectiles, which are not nearly so sympathetic towards the P.B.I. This year the Perseus-powered Mark II prototype was in the practised hands of Flt. Lt. G. N. Snarey, who was one minute loitering at about 55 m.p.h. and the next was doing a happy 230-odd.

The party could hardly have been counted complete without a show by at least one Spitfire. Actually No. 74 Squadron brought over nine and arranged them in some most attractive formations of which the "cross" and "arrow" were particularly admired. It was altogether a very pretty show and came to a fitting climax with a high-speed dive-past by flights.

Flt. Lt. Staniland's annual exhibition of aerobatic virtuosity carried us back some years to the time when the Fairey Firefly was the *dernier mot* in fighter design. He had borrowed one of these pretty little biplanes, which are so well suited to his technique, from the Belgian Air Force and put it "through the hoop" in that dashing fashion for which he will long be remembered. His rolls were not so low as some we recall, but time and again he brought the Firefly down to a few feet from the grass to collect as much speed as he might for an upward roll or a rocket loop. It was Staniland at his best, and there is none better.

While the captains and kings were departing F/O. J. K. Quill set out in another Spitfire (with v.p. airscrew) and bade his adieus with tremendous zooms and upward rolls.

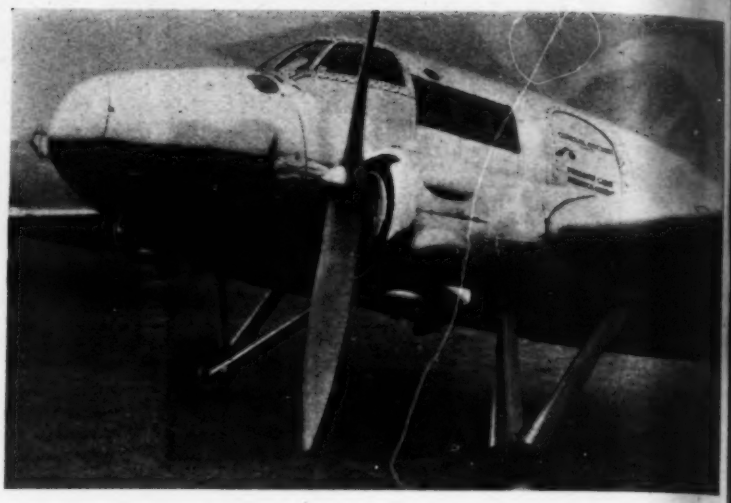
Parked were a Battle (with a Fairey airscrew); a Hampden; the production type Miles Master with its new mid-ventral radiator; and the Parnall trainer.

No. 907 (County of Middlesex) (Balloon) Squadron, A.A.F. from Stanmore, contributed one balloon, complete with winch and trailer, but the envelope was inflated with nothing less substantial than air.

The programme concluded with an A.R.P. display in which a three-sided "house" was ignited by an unpleasantly ebullient sort of incendiary bomb. Mr. and Mrs. Householder brought the official bucket and bicycle pump into action with unquestionable success, though one wondered if they would have tackled the task with such facility had there been any fourth wall to confine the dense smoke.

Mr. William Courtenay, indefatigable at the microphone, kept everyone within loudspeaker range *au fait* with the proceedings.

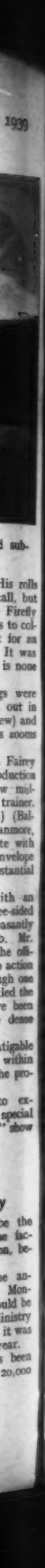
The Static Show.—Owing to extreme pressure on space in this special number, our report of the "static" show is held over until next week.



The pressure-cabin Monospar—designed to collect data for a full-sized sub-stratosphere airliner—made its first public appearance.

Vast Rolls-Royce Factory

WHAT, it is believed, will be the world's largest aero engine factory is to be erected at Hillington, between Glasgow and Renfrew.

Sir Kingsley Wood made the announcement in the House last Monday. He said that the factory would be managed on behalf of the Air Ministry by the Rolls-Royce Company, and it was hoped to begin production in a year.

A site of about 106 acres has been acquired, and employment for 20,000 men may ultimately result.